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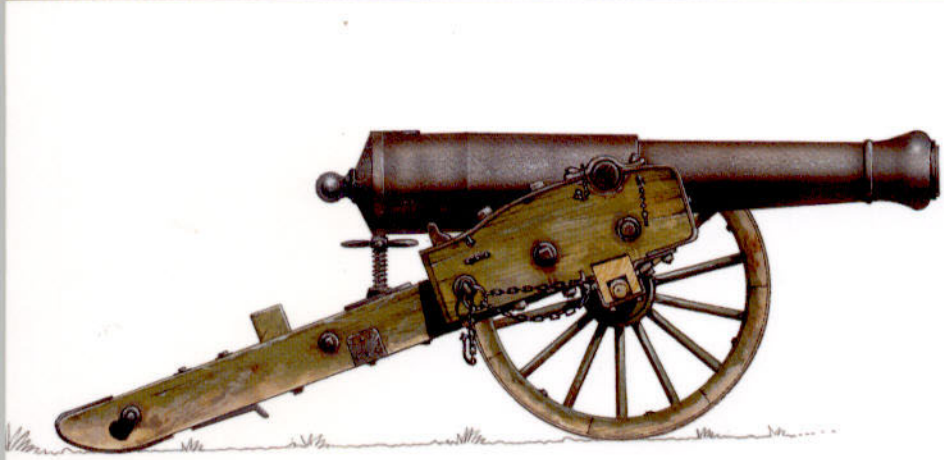
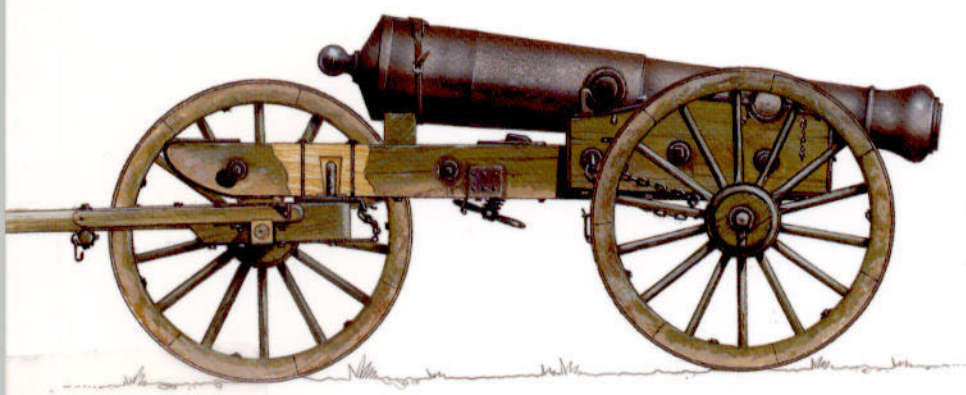
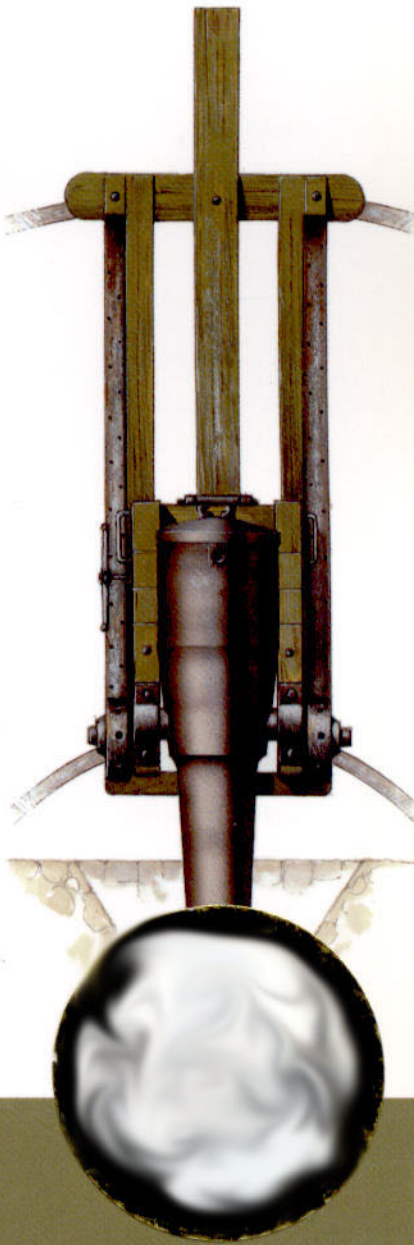
American Civil War Artillery 1861–1865 (2)

Heavy Artillery







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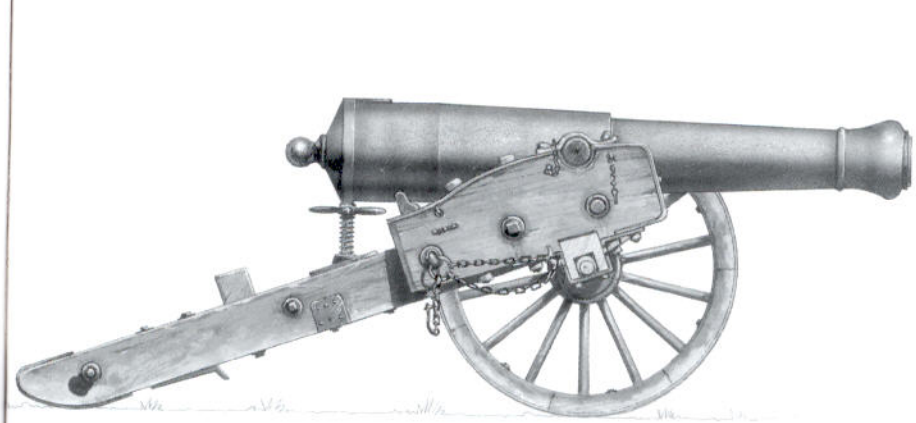

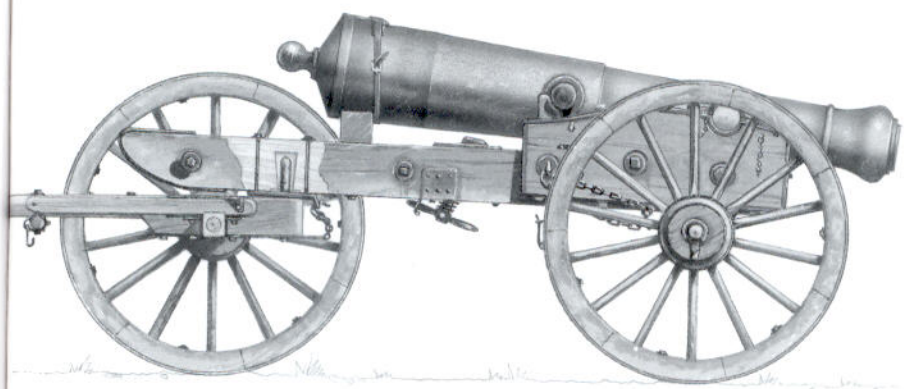

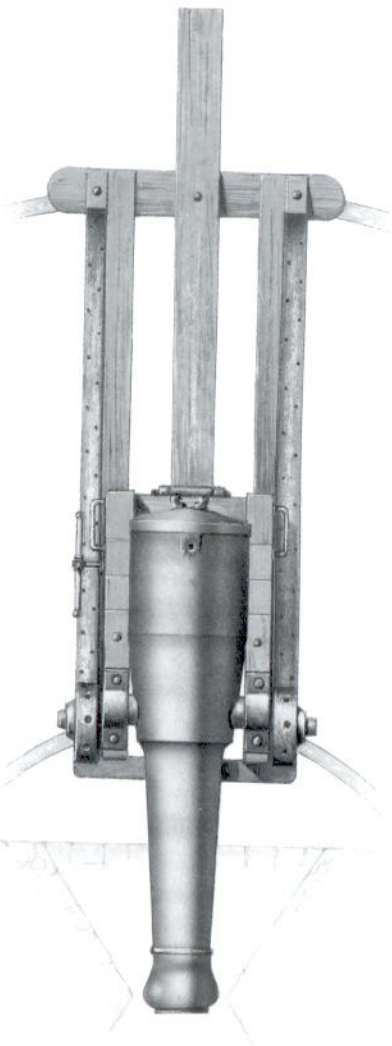

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TITLE PAGE **A 32-pounder seacoast gun at Fort Slemmer, Arlington Heights, Virginia, part of the defenses of Washington. The man in front of the carriage wears a gunner's pouch in which he carries friction primers to fire the gun, and holds a lanyard tight, apparently ready to fire. (Library of Congress)**

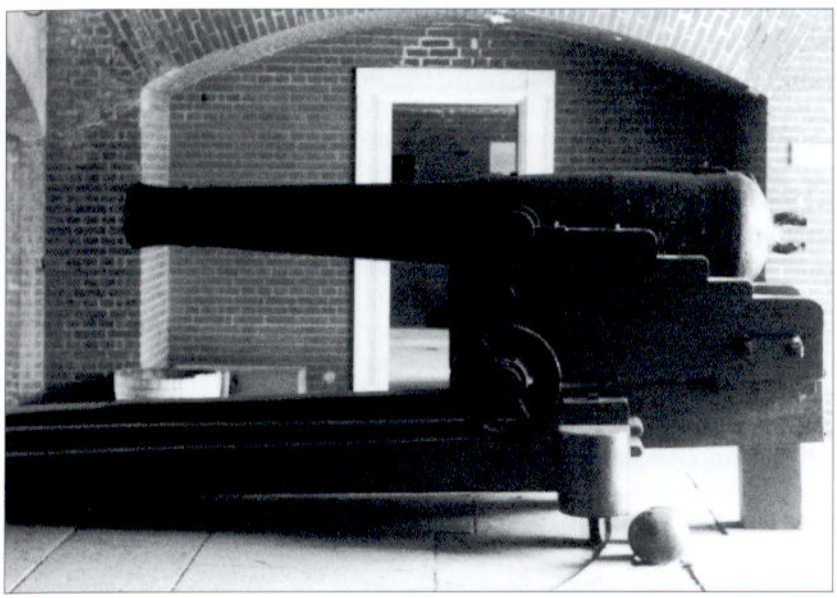
AMERICAN CIVIL WAR ARTILLERY 1861–1865 (2) HEAVY ARTILLERY

INTRODUCTION

Since heavy artillery made up the first line of defense of the United States, more attention was paid to it, and money spent on it, than on field artillery. In 1855, for example, the Chief of Ordnance reported having acquired 54 10-inch columbiads and 68 8-inch columbiads. During the same year, for comparison, the army only acquired 39 bronze field guns and two bronze howitzers of all calibers. In all, the army installed 224 heavy seacoast and garrison guns, mostly in the San Francisco area, although a number went to a new fort at Key West. In 1855, the U.S. Army's ordnance park of 10-inch and 8-inch howitzers and seacoast howitzers numbered 2,319, with another 2,957 seacoast and garrison guns. There were also 269 mortars.

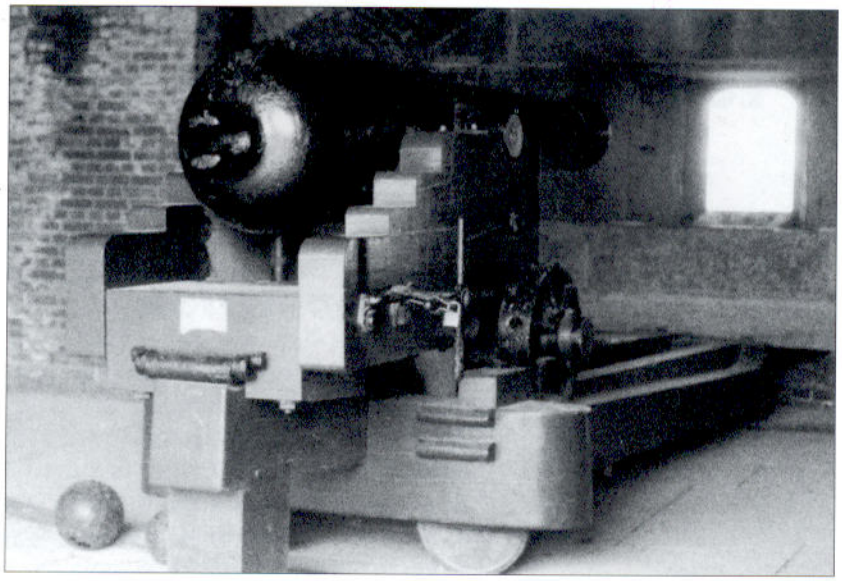
In January, 1860, there were 61 forts and batteries that defended America's coastal cities. However, very few of these were actually garrisoned, even though the forts were armed and, in theory, ready for action. Of all the forts along the southern coast that would face takeover in 1861, only three were manned: Fort Taylor, Key West, Florida, had a garrison of 52 men; Fort Sumter, South Carolina, had a garrison of 89 men; and Fort Pickens, Pensacola, Florida, had a garrison of 59 men. The others had either only an ordnance sergeant or fort-keeper on hand to maintain the fort and its guns or were totally abandoned.

Many of the guns of the United States fell into Confederate hands when the undermanned forts along the southern seacoast were taken over by local authorities. As the U.S. Secretary of War reported to Congress in June, 1861, "The Government arsenals at Little Rock, Baton Rouge, Mount Vernon, Apalachicola, Augusta, Charleston, and Fayetteville, the ordnance depot at San Antonio and all the other Government works in Texas, which have served as the depots of immense stores of arms and ammunition, have been surrendered by the commanders or seized by



A 32-pounder columbiad gun in a casemate of Fort Delaware, typical of all prewar coastal defense forts build along the Atlantic coast of the United States.

disloyal hands. Forts Macon, Caswell, Johnston, Clinch, Pulaski, Jackson, Marion, Barraneas, McRee, Morgan, Gaines, Pike, Macomb, Saint Philip, Livingston, Smith, and three at Charleston; Oglethrope Barracks, Barraneas Barracks, New Orleans Barracks, Fort Jackson on the Mississippi; the battery at Bienvenue, Dupré, and the works at Ship Island, have been successively stolen from the Government or betrayed by their commanding officers." With the sea forts, especially, came large stores of heavy artillery pieces. The Confederacy would start off on fairly equal terms with the Union in the area of heavy artillery, a rare exception to all other areas in which the North largely predominated.



The rear of Fort Delaware's 32-pounder columbiad shows how the carriage can be pivoted to be aimed.

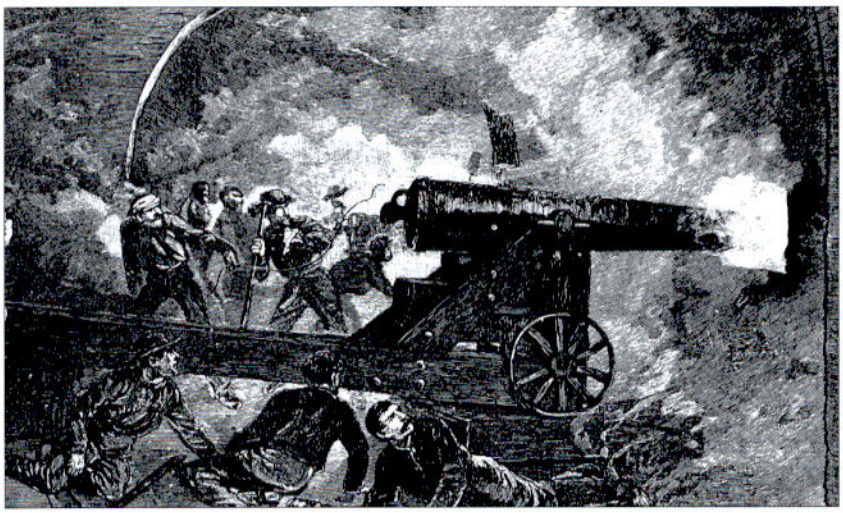
On April 20, 1861, the new Confederate Ordnance Department surveyed what they had acquired in their capture of federal forts. According to Major Josiah Gorgas, Chief of Ordnance, their park included: "Ten-inch columbiads, 8; 8-inch columbiads, 41; 24-pounder guns, 191; 24-pounder guns (flank defense), 9; 32-pounder guns, 188; 24-pounder howitzers (flank defense), 37; 10-inch mortars, 19; 6-pounder field guns, 2; 42-pounder guns, 48; 18-pounder guns, 5; 12-pounder guns, 2; 8-inch sea-coast howitzers, 13; 8-inch navy guns, 2; 13-inch mortars, 2; Coehorn mortars, 6, and 9-inch navy guns, 2; in fortifications, 375.

"At arsenals – Thirty-two pounder guns, 40; 24-pounder guns, 3; 24-pounder howitzers (for flank defense), 6, and 8- and 10-inch mortars, 5; total in fortifications and arsenals, 429."

These were not always the newest of guns. For example, Fort Macon, North Carolina, received its first iron 24-pounders in 1835–36, and these tubes were to be put to use in 1861. Over the years, the wooden gun carriages had rotted away, having received only minimal refurbishing. When the Confederates took over, they found four guns mounted on carriages rebuilt in 1844, while another 13 guns lay on skids on the fort's wharf. There would be much to do to get this, and the other Southern coastal forts into shape for defense.

On November 15, 1863, Gorgas, by then a colonel, reported that Southern sources had begun producing heavy artillery, the chief source being the Tredegar Iron Works in Richmond. By then, the Confederate army had received 31 heavy guns from Southern sources, and bought another 46 heavy guns from outside suppliers both in the South and abroad.

The army of Northern Virginia corps artillery chief, E. Porter Alexander, described a typical Confederate heavy artillery defense as a mixture of prewar columbiads and Southern-made big guns: "The heavy



A columbiad in a casemate under fire at Fort Sumter.

guns which defended the James River against the enemy's fleet were principally the ordinary eight-inch and ten-inch columbiads, and 'Brooke's rifles' of six and four tenths and seven inches caliber. These rifles only needed telescopic sights (which could not be made in the Confederacy) to be perfect arms of their class, their trajectories being more uniform than the sighting of the guns could be made by the eye. In addition to these rifles Captain Brooke also furnished some heavily banded smoothbores of ten and eleven inches caliber, to fire wrought-iron balls with very high charges against the ironclads, which would doubtless have been extremely effective at short ranges."

Even after losing all the guns it did to the seceding Southerners, the U.S. Army had a lot of heavy artillery remaining at its disposal and a much greater manufacturing capacity that could easily replace what it had lost and more. At the outbreak of hostilities, the U.S. Ordnance Department counted 544 siege guns on hand, and, by June 30, 1862, had added 211 siege guns, for a total of 755. Similarly, it had 1,508 seacoast guns at the beginning of the war, and by June 30, 1862, had acquired 302 more guns for a total of 1,810. A year later the U.S. Army had on hand 1,090 siege guns and 1,926 seacoast guns and mortars. During the year between June 30, 1863, and June 30, 1864, the Ordnance Department reported issuing another 604 siege guns and 1,127 seacoast guns and mortars. Finally, on June 30, 1864, the Ordnance Department reported that a year earlier it had on hand 346 siege guns and mortars, had acquired another 424, issued 32, and had on hand 738 of these weapons. As to seacoast guns and mortars, it had 812 on hand a year earlier, acquired 612, issued 593, and had 831 seacoast guns and mortars left over.

Union forces had a different heavy artillery problem than did the Confederates, who merely had to use their heavy artillery for defense. First, Union forces needed their heavy guns in defensive fortifications, not only inland as around Washington, D.C., but along the coast as at Fort Warren, Boston; Fort Jay, New York; and Fort Delaware, Delaware City. Second, Union forces needed heavy artillery to besiege Confederate forts.

COLUMBIADS

The columbiad is a type of gun dating from the beginning of the 19th century and is considered the first piece of purely American-designed ordnance. It first saw service in the War of 1812, both on ships

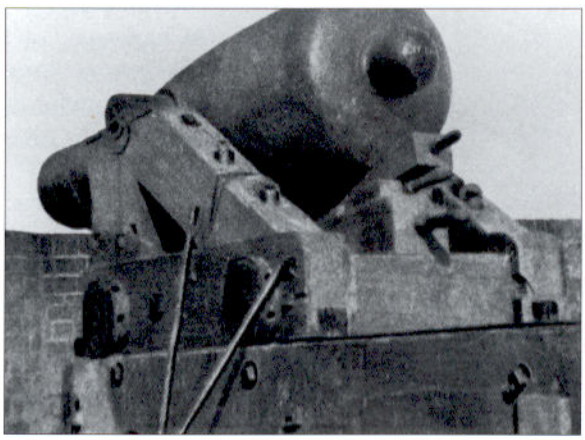
and with the army, and came in 24-pounder, 50-pounder, and 100-pounder sizes. In 1811, the first 50-pounder columbiads appeared for use as seacoast guns, followed by the 100-pounder columbiads in 1819. Originally, these were short, large-bore cannon used to fire solid shot and were made with a chamber at the base of the bore like a howitzer. In 1844, the weapon was redesigned to accept a larger powder charge by lengthening the tube and increasing the tube's weight. In practice, this did not work, and the previous size charges remained the standard. A further change was made in 1858 with the removal of the muzzle swell and base ring. The powder chambers were also eliminated.

Columbiads were made with elevating ratchets that ran all the way up the face of the breech, permitting elevation to 39°, rather than the 15° elevation possible for a gun that used an elevating screw or quoins placed under the breech.

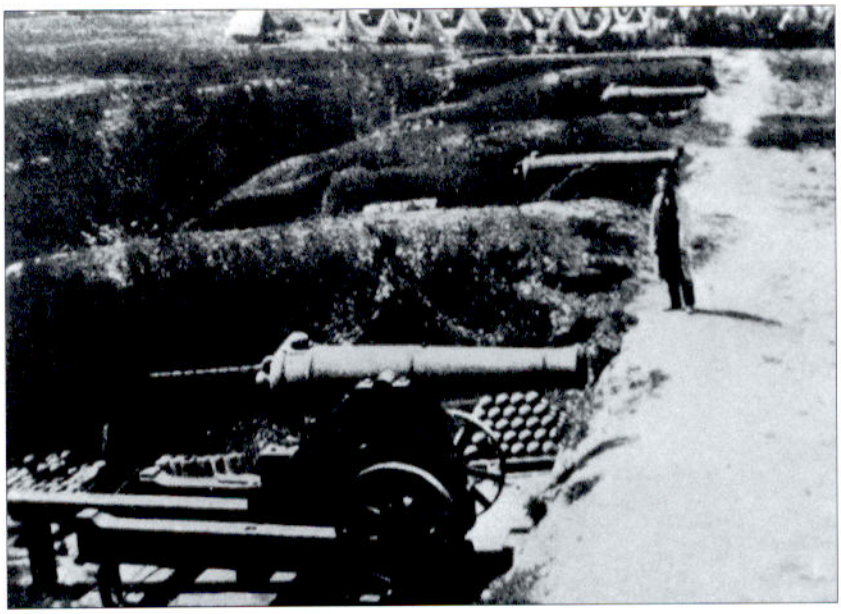
Columbiads had become larger by the Civil War. According to Colonel Henry Scott, writing in 1861, the columbiad was: "An American cannon invented by Colonel [George] Bomford [1780 - 1848], of very large caliber, used for throwing solid shot or shells, which, when mounted in barbette, has a vertical field of fire from 5° depression to 39° elevation, and a horizontal field of fire of 360°. Those of the old pattern were chambered, but they are now cast without, and otherwise greatly improved. The 10-inch [128-pounder] weighs 15,400 lbs., and is 126 inches long. The 8-inch columbiad [64-pounder] is 124 inches long and weighs 9,240 lbs. Rodman's 15-inch columbiad [49, 100 lbs] ... was cast at Pittsburgh, Pennsylvania, by Knapp, Rudd & Co., under the directions of Captain T.J. Rodman, of the Ordnance Corps, who conceived the design, which he has happily executed, of casting guns of large size hollow, and by means of a current of water introduced into the core, which forms the mold of the bore, cooling it from the interior, and thus making the metal about the bore of the hardest and densest, and giving the whole thickness of metal subjected to internal strain its maximum strength."

The Rodman method of casting was developed in the mid-1840s and consisted of cooling the gun from the inside out to improve stress resistance when firing. An army officer, Rodman offered the casting system to the Ordnance Department, but was turned down. He then went into business with Charles Knapp of the Fort Pitt Foundry, which began casting guns made by this system. As it turned out, Rodman's calculations were correct, and as a result larger columbiads could be cast, using the Rodman system, than could have been before. Rodman-cast guns have smooth, flowing lines, and as a result many period cannoneers incorrectly called the 3-inch Ordnance Rifles "Rodman guns."

The major Southern cannon founders, the Tredegar Iron Works and the Bellona Foundry, both in Virginia, had, before the war, rejected the Rodman casting system. As a result, they were limited in the size of columbiads they could cast. Tredegar finally learned to use the Rodman casting method, and in November, 1864, finally



This smoothbore in Port Royal, South Carolina, is mounted on the standard wooden carriage. Notice how it is elevated by means of quoins, or wedges with handles, shoved between the bottom of the tube and the top of the carriage. The carriage is mounted on a center pintle so that it can be revolved in a complete circle. (Library of Congress)



Prewar smoothbores pressed into service by the Confederates and mounted in the water battery along the Mississippi River at Vicksburg. The vents are covered to protect them from the weather by metal caps secured to the tube with leather straps. (Library of Congress)

cast a 12-inch gun using this system. However, it was too late in the war to produce such guns in any numbers. The 15-inch columbiad requested in 1861 from Tredegar was never produced. One of Tredegar's first efforts, a 6.4-inch columbiad, was sent to the defenses of Savannah, where it blew up on the first shot, killing two and wounding several others. Robert E. Lee, an observer, was narrowly missed by one of the pieces of the gun.

Bellona, although it never did cast any guns with the Rodman system, produced some 15 8-inch and 10-inch columbiads in 1862, until its production was interrupted by a fire in the foundry. By June, 1863, production of columbiads at Bellona resumed, but in 1863 the foundry delivered only 12 10-inch columbiads, along with two 7-inch guns and two 9-inch guns. A 10-inch Bellona columbiad in the West Point collection bears the serial number 67 and an 1864 date.

In September, 1861, a Natchez, Tennessee, newspaper reported: "An 8-inch columbiad has been manufactured at the foundry of Messrs. Bennett & Lurges of New Orleans under the superintendence of Mr. Daniel Brasill, according to the most approved pattern. It was cast solid and bored. The time occupied in boring was two weeks, and when it was tested, according to the general rules for that purpose, it was found to stand 'all that could be put upon it.' Shells were thrown from it without straining, a distance of a full two miles." Before New Orleans fell, the company cast five of these guns, each weighing 11,000 pounds.

Noble Brothers & Co., Rome, Georgia, cast several columbiads, but these were rejected by the Confederate Ordnance Department for faulty casting.

In terms of range, Colonel Scott reported of the gun at Fort Monroe: "The mean ranges at 6° elevation, of ten shots, was 1,936 yards, and the mean lateral deviation 2.2 yards; 35 lbs. of .6-inch grain powder being the charge and 7" the time of flight. At 10° elevation and 40 lbs. of powder, large grain, the range was 2,700 yards, and the time of flights 11".48. At 28° 35' elevation the range was 5,730 yards; time of flight 27", and the lateral deviation, as observed with a telescope attached to one of the trunnions, very slight."

On the Confederate side, Major Edward Manigault, commander of the Siege Train, Charleston garrison, reported on typical firing patterns with an 8-inch columbiad on August, 17, 1863, "... opened fire at 11 A.M. from the 8 in columbiad in Battery Haskell. According to instructions directed the fire entirely on the heavy Rifle Batteries to South of the House on Morris Island known as Graham's Hd. Quarters.

Fired 27 shots from this columbiad in course of day. With 8 lb. cartridges, average elevation of 22° 30". With 10 lb. cartridges, an average elev. of 20°. The practice was not good and all the shells failed to burst except about three."

The Confederates also tried turning prewar smoothbore columbiads into more modern rifled pieces, apparently with some success. On January 9, 1864, General P.G.T. Beauregard wrote Colonel Josiah Gorgas, Chief of Ordnance, the results of experiments in ordnance tried at Charleston, in which he commanded: "I have delayed answering your letter of the 27th November, 1863, referring to the rifling and banding of 8-inch and 10-inch columbiads, until I could carefully reconsider my preconceived views and subject them to the test of actual experiment.

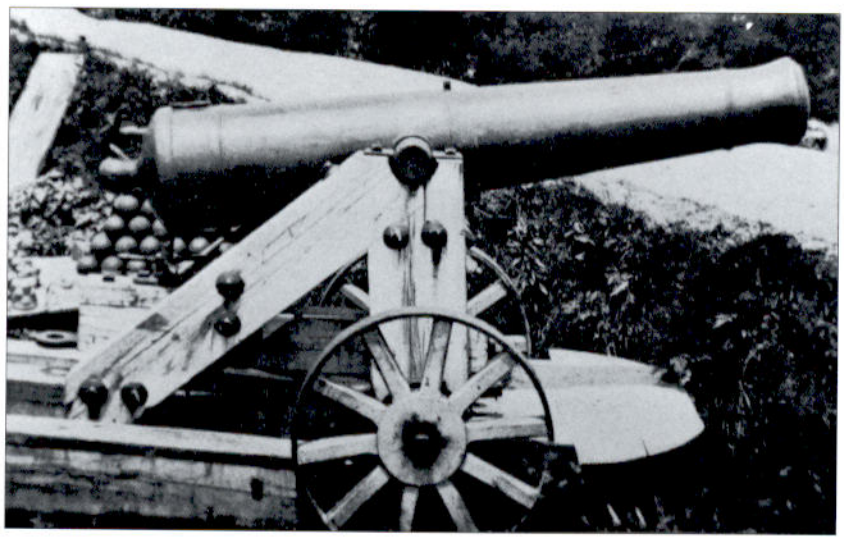
"Up to this time, however, the enemy have not given me an opportunity of trying the 10-inch rifled and banded columbiads as fully as I desire; but so far the results with the 8-inch rifled and banded pieces have been most satisfactory. Your letter alludes chiefly to the 10-inch gun, but as your objections and conclusions must apply equally to the 8-inch as to the 10-inch, I must acquaint you that an 8-inch gun, rifled and double banded, in position at Fort Moultrie, has been fired through some four or five different engagements, in all over 100 times, with shell weighing over 100 pounds and bolts 140 pounds, with most satisfactory results, giving a greater range with the same charges and less elevation than the smoothbore, with shell and shot of less than half the weight. The gun is uninjured, and there is no apparent reason why it should not last a long time.

"It is regarded by Gen. Ripley as the best gun in the battery, and in action has an immediate effect upon the enemy's ironclads, which always try to avoid it.

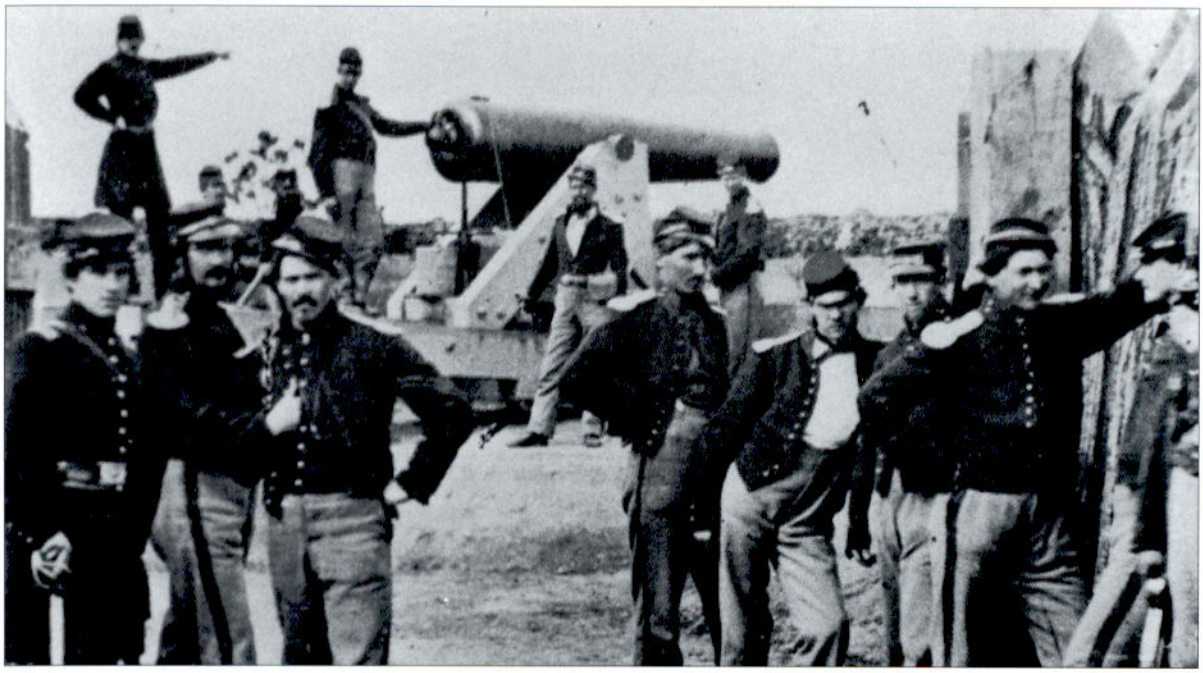
"This having proved a success, three others of the same kind have been prepared and placed in position in the harbor batteries, but owing to the limited supply of projectiles a thorough test has not been applied. The charges used have been 8 pounds and 10 pounds of coarse-grained powder, and the range shows these to have been sufficient to give full velocity to the projectiles for distances of 1,000 yards.

"The experiment on 10-inch columbiads was first made with one which had a trunnion knocked off at Fort Sumter, and the rifling and banding of which was executed by a private firm. Another one was banded at the arsenal and rifled by the same parties who altered the first one. When finished I had the former mounted on Sullivan's Island and the latter on James Island. Gen. Ripley writes as follows touching both:

"They have both been tried, the latter (One at



A Confederate naval gun at Yorktown. Note the solid shot piled up behind it within easy reach of the crew.



A 32-pounder seacoast gun at Fort Slemmer, Arlington Heights, Virginia, part of the defenses of Washington. The man in front of the carriage wears a gunner's pouch in which he carries friction primers to fire the gun, and holds a lanyard tight, apparently ready to fire. (Library of Congress)

Fort Johnson, banded at the arsenal) with a projectile invented by Capt. Harding, weight[ing] about 215 pounds, and a Parrott projectile, weight[ing]about 250 pounds, and charges of 15 pounds and 16 pounds. With the latter, excellent results were obtained. The former projectiles failed generally to take the grooves, and with 16 pounds broke up. The practice I have been informed has been delayed by the starting of one of the bands which was defectively welded, the gun itself being uninjured.

"The other gun has been fired with 12 and 15 pounds of powder with Harding's projectiles only, others not having been furnished. Twelve hundred yards was obtained with 2 ½ degrees elevation and 12 pounds large-grained powder, when the projectiles took the grooves. With 15 pounds the projectile broke. The gun thus far is uninjured, and I have no doubt will continue so under any ordinary practice. This will be continued as soon as Parrott projectiles can be procured.

"If Parrott shot are provided, range, accuracy, weight, and velocity are obtained with safe charges, and from the effect of the 8-inch bolts on the monitors I believe one or two well-directed shots from the 10-inch rifles will drive any one of them out of action, and half a dozen permanently damage and sink them.

"The two 10-inch columbiads selected for experiment weighed over 15,000 pounds before they were double-banded, and afterward, respectively, 22,000 pounds and 20,000 pounds.

"The guns selected for the purpose were captured at Forts Moultrie and Sumter in April, 1861, of the very best iron, and superior to those now manufactured by the Ordnance Department of the Confederate States. I do not say that these rifled and banded 8 and 10 inch guns are the best that can be made of their calibers, but, in my belief, they are the best we can get in the present condition of our manufacturing resources. It is proper to add that the number of guns at our disposal of the proper description for alteration is limited."

This 32-pounder at Fort Richardson, Virginia, is mounted on a carriage. As such, it could be moved with field forces, the heaviest gun in the American arsenal that could be moved easily. It would see use at places such as Fredericksburg in December, 1862. (Library of Congress)

Columbiads were initially placed on standard wooden carriages. However, an all-iron carriage was developed by the Union army and this was described by Colonel Scott: "The gun is mounted upon the new iron center pintle carriage, which with requisite lightness has great strength and stiffness; and to facilitate the pointing from 5° depression to 39° elevation, a slot is cut in the knob of the cascabel, and a ratchet is formed on the base of the breech to receive a 'pawl' attached to the elevating screw. If the distance be greater than the length of a single notch of the ratchet, the piece is rapidly moved by a lever which passes through an opening in the pawl. If the distance is less, than the elevating screw is used. The piece was fired and maneuvered during the trials at Fort Monroe, with great facility, being manned by 1 sergeant and 6 negroes; the times of loading were 1'15" and 1'3". Time in traversing 90° 2'20", and in turning back 45° 1". Time of loading, including depressing and elevation, 4' and 3'18"." The Confederate Army lacked the facilities and even raw materials for such carriages and depended on the older wooden carriages for their siege guns.

At the siege of Fort Pulaski, three 10-inch columbiads recoiled off their pintles (the iron pins that fastened the carriage front to the platform, allowing the rear to roll on a traverse track) on their first shots. It turned out that the guns were mounted on the new iron carriages, but the pintles were the old wooden carriage type that did not work with the new carriages.

Nor could the iron carriages easily be used for besieging Confederate positions where Union troops had to drag the giant guns into position. Lieutenant-Colonel Joseph R. Hawley, 7th Connecticut, wrote of the

The near 32-pounder has been mounted on a naval carriage, while the one in the distance sits on a wooden garrison carriage.

siege of Georgia's Fort Pulaski: "[as] A columbiad weighs from 13,000 to 15,000 pounds, it has been no light job to drag them up there, the wheels sometimes sinking to the axle and the tugging procession sneaking along an open beach within 1,600 to 2,000 yards of the scores of guns in Pulaski and nothing but a placid bay between."

As with all guns, especially when it was impossible to x-ray tubes to determine defects, there was danger in firing even usually reliable columbiads. When giant guns like columbiads burst, everyone around was endangered. Confederate Major Edward Manigault reported such an event from the defenses of Charleston on September 18, 1863: "At the 12th Shot and at 5 H. 10 M. P.M. the 8 inch [seacoast] Columbiad burst ... The columbiad was fired with 10 lbs of powder, a solid Shot, and at an elevation of 19 1/2 degrees when it burst. The Cartridge & Shot were reported as being 'home'." At the previous discharge, the Shell had burst about 10 or 30 feet in front of the Gun. From a point 2 ft. in front of the center of the Trunnions, the Chase remains perfect. The Body & breech of the gun is separated into two equal portions, the plane of Fracture being vertical and directly through the vent & axis of the Bore. One of these pieces was thrown over a house 10 ft. high and fell to the Right at a distance of 75 ft. from the Chassis. The other half was thrown to the left crushing the leg of Private [Wade] Mills [Co. K, 2d S.C. Artillery] against the Stump of a Cedar Tree and fell at a distance of 30 ft. from the Chassis. The Gun Carriage was destroyed; the Chassis uninjured.

"This gun has been fired by us about 393 Times, with an average elevation of 20°. The Charge usually 10 lbs of Powder and a Columbiad Shell [50 lbs.]. But occasionally 8 lb. charges were used with an Encreased Elevation of about 2 degrees. Also some 8 in. Solid Shot have been fired. The Bore appeared to be as perfect as possible, with the exception of a very slight hollow or 'lodgement' a little in front (5 in.) of the Chamber (1/32 in. deep, say) and a slight 'score' in the Chase part of the Bore. The vent was somewhat enlarged and irregular but to no great extent.

"I have been informed by a well instructed Ordnance Officer of great experience (Captain, now Genl. Boggs) that the Guns of 1855 & 1856 had generally proved not to be guns of much endurance.

"The Marks upon the Gun were as follows:

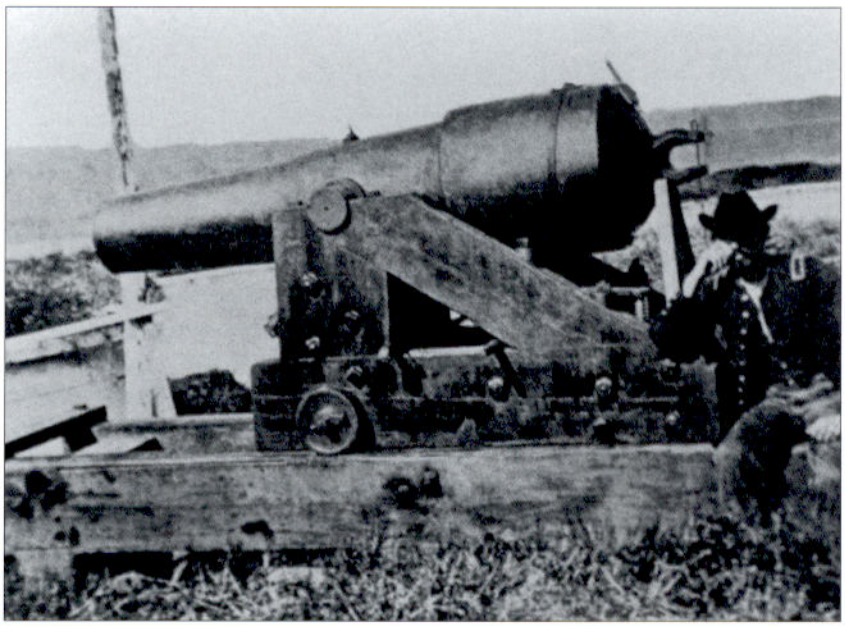
"Right Trunnion marked R.P.P. [stamped above] W.P.F. Left Trunnion, 1855. On the Breech, 9206. On Muzzle, No. 80 [at top] B.H. [at left]. Near the Trunnion, sight Mass, U.S."

HOWITZERS

Howitzers used for siege and garrison work were cast iron and came in two sizes, 24-pounder and 8-inch. The 24-pounder was already an old weapon by the beginning of the war, having been introduced in 1839, although apparently not produced until several years later. The main job for the 24-pounder howitzer was as a weapon placed on the flanks of fortifications to protect against infantry attack, rather than for use in counter-battery operations. As such, it was usually mounted on a flank casemate carriage.

The 8-inch siege howitzer was introduced in 1841 and came with a cylindrical chamber that joined the bore with a spherical curve that fit a shell exactly. The powder chamber held exactly four pounds of powder, the standard charge. The weapon was designed to be used mainly to smash into masonry and earth left over after fortification walls had been penetrated by larger guns. The 8-inch howitzer was also designed for ricochet firing.

The 8-inch howitzer could be mounted on a 24-pounder carriage. However, when that was done, the elevating screw had to be removed and the cannoneers use a quoin for adjusting the elevation. The howitzer barrel was just too short to rest on the screw, being only 46.5 inches long. Even with quoins, it could be elevated at a very high elevation, giving the weapon a maximum range of some 1,600 yards and a minimum range of 300 yards.



This 32-pounder naval gun has been adapted by the Confederates to hold a heavier charge than usual by placing a band around the breech. It was part of the defenses of Vicksburg. (Library of Congress)

The army also had an 8-inch seacoast howitzer that was introduced in 1839. It had a 93-inch-long tube. Officially it had been dropped from the rolls by 1861, but in fact many of these weapons were in the fortifications of both sides. As well, a 10-inch seacoast howitzer was adopted at the same time as the 8-inch version, but with a 101.5-inch tube, and was dropped from rolls at the same time as the smaller piece.

Howitzers also saw improvised use. In 1866, the Army of Northern Virginia corps artillery chief, E. Porter Alexander, recalled that: "On several occasions during 1863, and 1864, where mortar fire was desirable in the field, the twelve and twenty-four pounder howitzers were used for the purpose very successfully, by sinking the trails in trenches to give the elevation, while the axles were run up on inclined skids a few inches to lift the wheels from the ground and lessen the strain of the recoil. The skids would not be necessary where the desired range is not great."

RIFLED GUNS

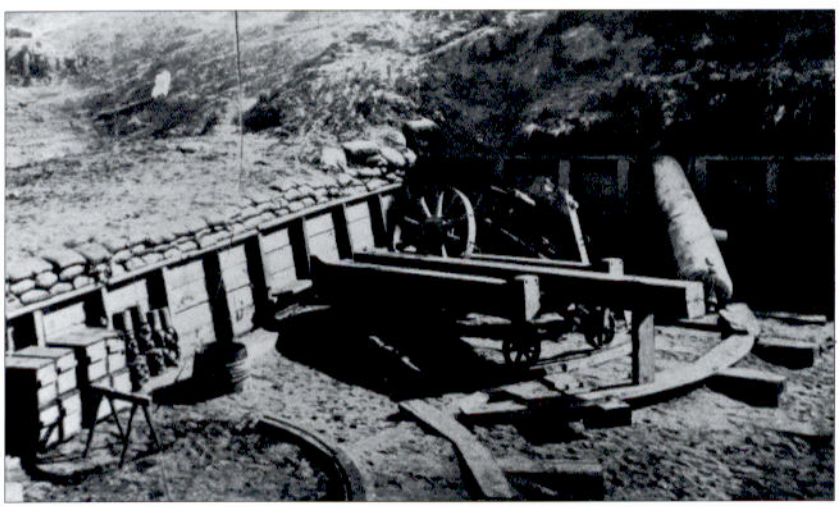
The U.S. Army's M1861 4.5-inch siege rifle and the M1862 4.62-inch siege rifle were 12-pounder weapons that saw wide use on both sides. The U.S. Army also developed its M1861 4.5-inch siege rifle, a weapon that looked much like a 3-inch Ordnance Rifle but was made of cast, not wrought, iron. One Union artillery expert later reported that: "The two siege batteries of 4.5-inch ordnance guns which accompanied the Army of the Potomac in all its movements from Fredericksburg were of great use from their superior range and accuracy, in silencing troublesome field batteries and in other field service and could be moved with the reserve artillery without impeding the march of the army ..." The weapon, using a 3.25-pound charge behind a 25.5-pound patent Dyer shell at 10° elevation, had a range of some 3,265 yards. The 30-pound Hotchkiss or Schenkl projectiles were the most commonly used ammunition for this piece.

Confederate officials also produced similar iron siege rifles, with the Tredegar Iron Works in Richmond casting its first 8-inch rifle in June, 1861, its first 9-inch rifle that July, its first 10-inch rifle and its first 32-pounder rifle that November, and its first 4.62-inch rifle in December, 1862.

On August 30, 1863 Confederate Major Edward Manigault, on the defenses of Charleston, noted: "Late this afternoon Received at Battery Haskett one 4.62 in. Rifle Siege Gun. Weight 5,750 lbs. Marked B.F. [Bellona Foundry] J.L.A. [Junius L. Archer, foundry owner] 1862. Band [reinforcing band over the breech] 19 in. long x 2 in. thick. Gun & Carriage look new. Siege Carriage." This was but one of several such guns Manigault's defenses owned, and they were his favorite guns. For example, he wrote on September 4, 1863, that: "The 4.62 Rifle is by far the most accurate and reliable one we have ..." Bellona does not appear to have produced Brooke rifles, so this weapon is likely to be a copy of the earlier U.S. Army 4.62-inch siege rifle.

As far as capabilities, he noted on August 20, 1863: "Fired 20 Shots from 4.62 in. Rifle Siege Gun twelve of which were directed to Morris Island and eight at the Mud Battery in the Marsh S.E. from Legare's Point. With 3 pnd. Charge of powder the 4.62 in. Rifle required about 20° Elevation to reach Morris Island and 10 ½ deg. to reach Mud Fort in Marsh."

As with any large guns, mishaps could happen with the 4.62-inch siege rifle. On August 22, 1863, Manigault recorded: "At 2:20 P.M. the 4.62 in Rifle Siege Gun on Platform No. 1 burst. The breech was blown out without any other damage being done. The Bands were neither broken nor



One of the 32-pounders at Fort Fisher after the fort's bombardment and eventual capture. Note how the carriage has been set up so that it can be moved easily from side to side. (Library of Congress)

thrown off and the rear one only somewhat loosened." Generally, however, the guns were durable. He recorded that on August 30, 1863: "Up to 3 P.M. today the 4.62 Rifle has been fired 155 times and the vent is much enlarged and somewhat ragged on the outside."

Charles T. James, a U.S. senator before the war, designed a system of rifling bronze smoothbore guns, as well as a totally unique 14-pounder bronze (a few of steel) rifle for the U.S. Army. These largely date from 1861 - 62, the year in which James was killed in an accident involving one of his experimental guns. James rifles in 24-, 32-, and 42-pounder sizes were used by Union forces, including those that took Fort Pulaski, where they were considered highly effective. In appearance they were smoothly tapered tubes that resembled 3-inch Ordnance Rifles.

A row of columbiads at the Confederate water battery of Fort Johnson in Charleston Harbor. Damage to the near carriage seems to have been deliberate. (Library of Congress)

PARROTT RIFLES

A West Point graduate, Robert P. Parrott, who had resigned his commission in 1836 to head a private foundry, designed a tube that could be used for both siege guns and field artillery. Essentially, his cast-iron tube had a wrought-iron reinforcing wedge-shaped band wrapped around the breech with the joints pounded together until welded shut. In the process, the tube was rotated on rollers, a stream of water being shot inside to keep the tube cool as the hot band was wrapped around it. Because the tube rotated, the band cooled and clamped itself uniformly to the breech, instead of being tighter where the weight pulled the band down on the top of a stationary piece, while the bottom part was less tightly bound to the tube.

This band allowed the breech to absorb greater stress than an unbanded, or even typically banded, cannon. Indeed, the weapon was known as a tough cannon that could take a beating and remain in use. It was easy and cheap to produce, which was important in a war as large as was the Civil War. They were produced at the West Point Foundry under Parrott's supervision.

The Parrott's main problem was the tendency for the tube to explode in use, usually just in front of the band, after prolonged service. In October, 1865, the Chief of Ordnance reported that: "The many failures, by bursting, of the celebrated Parrott guns in the land and naval service have weakened confidence in them, and make it the imperative duty of this department to seek elsewhere for a more reliable rifle gun." The larger the Parrott, the more liable it was to burst.

A columbiad at Confederate Fort McAllister, outside Savannah, Georgia. Note the ammunition, solid shot, piled up for ready use. The weapon can be rotated through 360° on its platform and track. (Library of Congress)

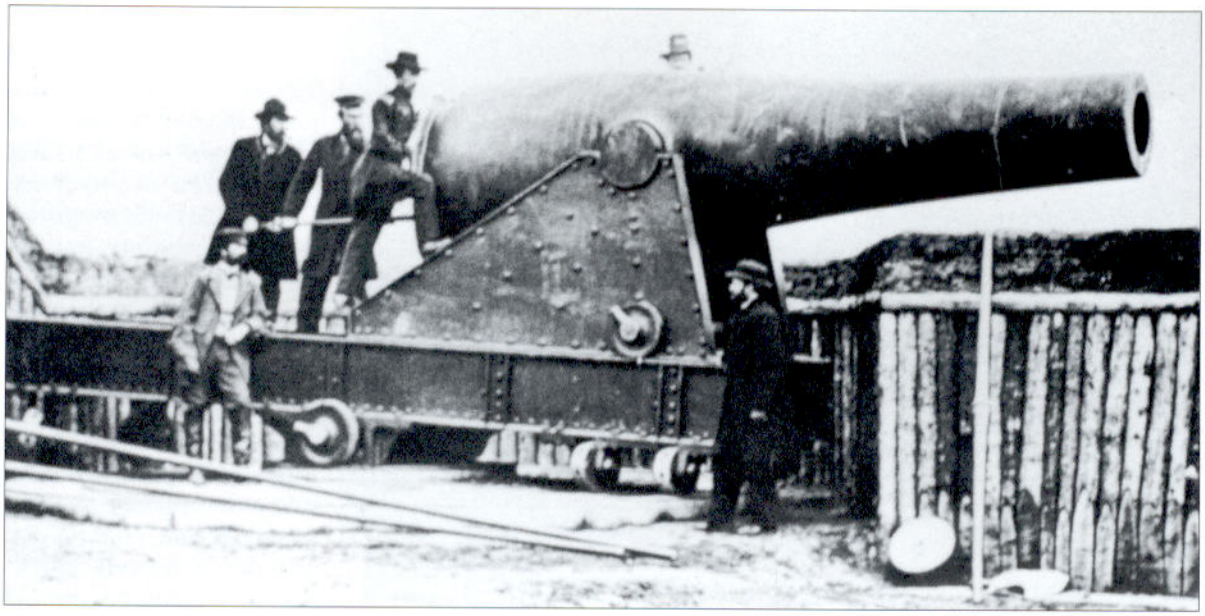
Confederate Major Edward Manigault, in the defenses of Charleston, wrote on August 19, 1863: "At the 13th Round the 30 pndr. Parrott Gun burst. One man badly stunned, and one slightly so. No other damage done." On the Union side, in the same siege, a 30-pounder cast in 1863 fired 4,606 rounds, an average of 127 rounds a day, at a range of 6,600 yards when it finally burst into seven pieces. The real problem was that it was impossible to tell exactly when a Parrott would burst. For example, of two apparently identical 100-pounder Parrotts firing into Charleston, one burst on the 122d round, while the other lasted until the 1,151st round.

Heavy Parrotts also had a tendency to break their elevating screws, due to the weight being distributed on the rear of the tube. With all this, the chief engineer in the Union Army outside Charleston reported that: "There is perhaps no better system of rifled cannon than Parrot's [*sic*]; certainly none more simple in construction, more easily understood or that can, with more safety, be placed in the hands of inexperienced men for use."

The first Parrott, a 10-pounder, was produced in 1860 and the weapons went into full production in 1861. For siege purposes, the West Point works produced a number of 30-, 100- (6.4-inch), 200- (8-inch), three 300- (10-inch), and even a 600-pounder version of the light-weight field weapon. The U.S.-issue weapons are marked with a date and the initials RPP and WPF. The 4.2-inch, or 30-pounders, the smallest heavy Parrotts, came in two versions. The first version had a doorknob-shaped cascabel and a muzzle swell; these were produced through 1862. Later versions had a more elongated cascabel and a straight muzzle.

In 1862 alone, the U.S. Army bought 344 Parrott guns of various sizes. Indeed, by that year's end, the Army bought 411 Parrott field guns, 108 siege guns, and 38 seacoast defense guns. The Parrott was thus among the most common of all Union field pieces, despite its problems.

The ease of making such cannon did not escape the Confederates, and J.R. Anderson & Co. cast copies of them at its Tredegar Iron Works in Richmond beginning in November, 1861. The first ones they cast were 6-pounder versions of the weapon, a bore size they continued producing through August, 1862. In July they cast their first 30-pounder Parrott copy. Starting in August, 1863, the Macon Arsenal cast some 20- and 30-pounder Parrotts as well. The Selma Naval Gun Foundry, Alabama, cast at least a dozen 30-pounder Parrott rifles for use on ships and harbor and river defenses.



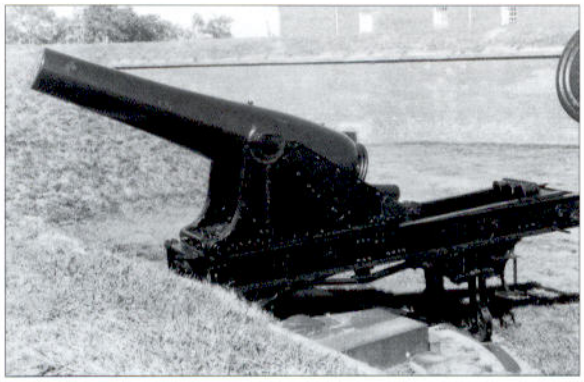
A 16-inch Rodman gun in the defenses of Washington, DC.

The larger Tredegar Parrotts saw action at Fredericksburg, where the two 30-pounders sent to Lee's army burst after prolonged firing, one after 39 rounds and the other after 54 rounds. "This was the only time in the war that we ever had such heavy guns in the field," recalled E. Porter Alexander, First Corps artillery chief in the Army of Northern Virginia. "At one of the explosions Genls. Lee & Longstreet & many staff officers were standing very near, & fragments flew all about them, but none was hurt."

MORTARS

The mortar is a snub-nosed, smoothbore weapon designed to hurl a ball a great distance into the air so it falls almost vertically into an enemy position. Usually mounted on heavy wooden beds most fell into the definition of siege or heavy artillery, although some were relatively small. The rounds fired were largely designed for use against personnel rather than objects such as masonry walls or enemy artillery. Hence, the preferred ammunition included shells (the primary round), grape, light and fire balls, and carcasses.

According to Colonel Henry Scott's 1861 *Military Dictionary*: "The following mortars are used in the United States service: The heavy 13-inch mortar, weighing 11,500 lbs., the whole length 53 inches, length of chamber 13 inches, and superior diameter of chamber 9.5 inches; the heavy 10-inch mortar, weighing 5,775 lbs., whole length 46 inches, length of chamber 10 inches; the light 10-inch mortar, weighing 1,852 lbs., the whole length of mortar 28 inches, length of chamber 5 inches; the light 8-inch mortar, weighing 930 lbs., whole length of mortar 22.5 inches, length of chamber 4 inches; brass stone mortar, weighing 1,500 lbs., diameter of bore 16 inches, whole length of mortar 31.55 inches, length of chamber 6.75 inches; brass Coehorn 24-pounder, diameter of the bore 5,82 inches, weight 164 lbs., whole length



A 16-inch Rodman gun at Fort McHenry National Park, Baltimore. These guns served as weapons defending the city through World War I.

16.32 inches, length of chamber 4.25 inches; iron eprouvette, diameter of the bore 5,655 inches, weight 220 lbs., length of bore exclusive of diameter, 11.5 inches, length of chamber, 1.35 inch. Mortars are mounted on beds, and when used, siege mortars are placed on a platform of wood made of 6 sleepers, 18 deck planks; and 72 dowels; fastened with 12 iron eye-bolts."

The M1861 10-inch mortar used a charge of one pound six ounces of powder to fire a 104-pound round (27 12-pounder iron canister balls and a bursting charge of 2.5 pounds of powder), 800 yards with a 13-second flight.

Lieutenant-Colonel Joseph R. Hawley, 7th Connecticut, watched the mortars in use at the siege of Fort Pulaski, Georgia. According to him: "... the twelve big mortars will each fire five times an hour (it is a slow job to clean, load and aim them) making 60 shells an hour. Each mortar gives two reports, the firing of the mortar and the bursting of the shell."

In order to give the mortar some mobility during the siege of Petersburg, Union forces used a novel system. According to one of their artillerymen: "The great weight of the 13-inch mortar (17,000 pounds) renders it difficult to move and some satisfactory experiments were made with a novel platform. An ordinary railroad platform car (eight wheels) was strengthened by additional beams tied strongly by iron rods and was plated on top with iron. The mortar was placed upon the car (top of mortar nine feet above the tracks) and run down on the Petersburg and City Point Railroad to a point near our lines where a curve in the track afforded facilities for changing the plane of fire by advancing the car or drawing it back.

"The mortar fired with 14 pounds of powder recoiled less than two feet on the car which moved 10 or 12 feet on the track. The effect of the charge was taken up without damage to the axles, even when a full allowance of 20 pounds of powder was used ...

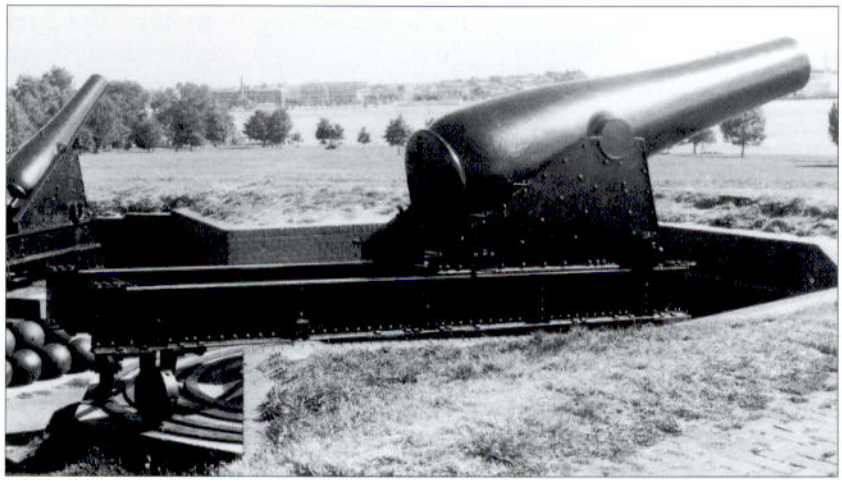
"Its practice was excellent ... of course with this platform, the plane of fire must be nearly paralleled to the track or the mortar will be dismounted, but by placing the car on a curve, a very considerable traverse can be secured without difficulty."

The light mortar most used during the war was the M1841 bronze Coehorn mortar, which weighed about 296 pounds on its bed (164 pounds for the tube alone), fired a 24-pounder shell, with a half-pound powder charge, some 1,200 yards. It was manned by a crew of four.

Tredegar cast its first mortar, a 10-inch model, in July, 1862, the first of 10 made that year. Another eight were cast in 1863, five in 1864, and one in 1865 for a total of 24 10-inch mortars. It cast its first 8-inch mortar in February, 1863, and thereafter cast a total of 15, most in late 1864. The Richmond-based foundry was the only major source of Southern-made siege mortars, although a private company, S. Wolff & Co., produced two 10-inch mortars in New Orleans. These were tossed into a canal basin on the fall of that city. A.N. Miller, a foundry in Savannah, produced one 15-inch and three 10-inch seacoast mortars in 1862 for that city's defenses. The Selma Naval Gun Foundry, Alabama,

produced 19 Coehorn mortars.

Confederate makers also produced a 12-pounder iron Coehorn mortar which they felt was an effective weapon. According to one Union artillery officer who examined a captured version of this weapon: "For practice against troops, the 12-pounder Coehorn is decidedly more deadly than the 24-pounder as its shell, when the fuse burns too slowly, does not bury itself on striking and the fragments thus scatter widely."



Another view of one of Fort McHenry's 16-inch Rodman guns. They are placed in a fortification outside the main fort, which is in the background.

In 1866, the Army of Northern Virginia corps artillery chief, E. Porter Alexander, described the variety of mortars Southern field armies used: "During the siege of Petersburg a number of iron twelve and twenty-four pounder Coehorn mortars were made and rendered excellent service. Wooden mortars were also made and tried for short ranges, but even when they did not split, the ranges were so irregular that they could not be made useful." Confederate artillerymen at Petersburg ran short of friction primers but continued firing their mortars by heating priming wires red hot and inserting them in the vents.

Mortars were useful in siege situations, but were not always available to field armies. Therefore, artillerymen often improvised by using tree trunks for their mortar tubes. According to a Union report of the siege of Knoxville: "The repeated assaults upon this fort, and the close proximity of the enemy's rifle-pits, made it very desirable to mount two or three mortars for the purpose of shelling out the enemy's trenches. As none were on hand, a wooden mortar was constructed, capable of throwing a 24-pounder howitzer shell. It was made of a live white oak, 2 ½ feet in diameter, and when finished, the thickness of the wood was 1 foot and in rear of the seat of the charge from 18 inches to 2 feet. It was hooped with three iron bands shrunk on, and mounted on a bed of oak. It was fired with a 24-pounder howitzer shell and 7 ounces of powder, and withstood the test admirably; but subsequently, being fired with the same projectile and 16 ounces of good powder, it burst in two."

NAVAL GUNS

Naval guns saw use not only on ships, but on seacoast defense fortifications on land, operated sometimes by naval crews and at other times by army heavy artillerymen.

The Union Navy was blessed with the ordnance creativity of Rear Admiral John A. Dahlgren, chief of Naval Ordnance from July, 1862, to June, 1863, when he assumed a sea command. His first heavy iron gun design was submitted in 1850, and a 9-inch smoothbore was cast to his design at the West Point Foundry. The 9-inch tube, which weighed

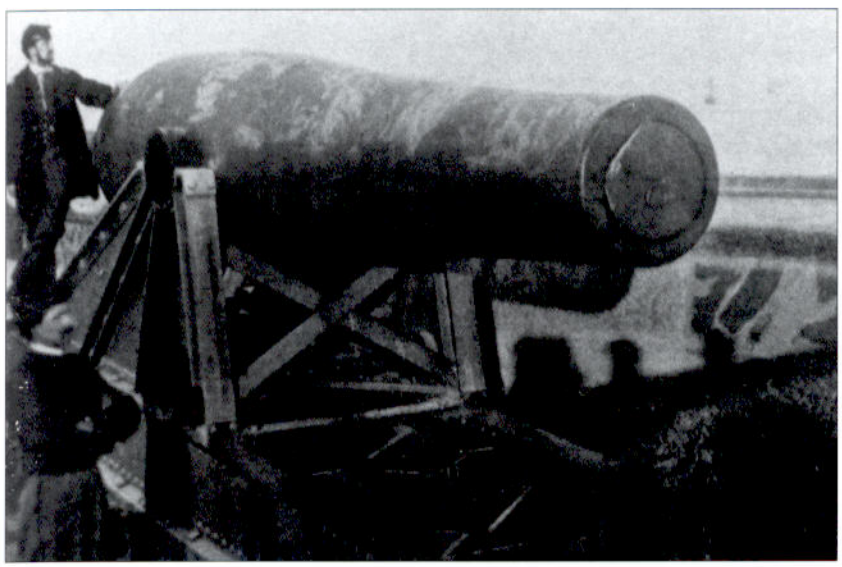
9,000 pounds, was successfully tested and led to its production in 10- and 11-inch (weighing 15,700 pounds) calibers as well. The weapon was designed specifically to fire shells into wooden vessels, but it was so strong that it was also capable of dealing with the increased charges fired into ironclads. In practice, the U.S. Navy used the 9-inch guns, which fired 70-pound shot, on broadsides, and the 11-inch guns, which fired 127-pound shot, for its pivot guns. The Dahlgren gun had an especially modern, smooth shape, leading British ordnance experts to dub them "soda-water bottles."

Dahlgren also designed 15- and 20-inch naval guns in 1862. These were cast at the Fort Pitt Foundry using the Rodman system of cooling them from the inside. These tubes were lighter than the true Rodman guns, weighing 42,000 pounds as opposed to some 50,000 for the Rodmans. Their maximum diameter was 48 inches, and the bore length was 130 inches. They could fire solid shot weighing 440 pounds, cored shot weighing 400 pounds, shells weighing 330 pounds, grape, or canister.

In 1864, the Navy had a 20-inch gun cast to Dahlgren's design. It was 204 inches long with a bore 163 inches long. Its maximum diameter was 64 inches, and total weight of about 100,000 pounds. It would fire a 1,000-pound cored shot, taking a 100-pound standard charge. It apparently saw only experimental use, in which it was successful in breaking through the toughest iron plate available.

The Navy also ordered several 13-inch Dahlgren guns, which were cast in the standard manner, but they proved a failure, each exploding after only firing several rounds of solid shot. Versions cast in the Rodman style successfully fired over 500 cored shot rounds in experiments, but they were never put into production, the 15-inch being ordered for Monitor-class boats instead.

Additionally, some 10-inch Dahlgren guns were cast, as were 50- and 80-pounders. The 50-pounder first appeared in late 1861, while the 80-pounder appeared in the middle of that year. The 80-pounders exhibited an alarming tendency to burst when firing, and were soon replaced. The log of the U.S.S. *Hetzel* noted, on February 7, 1862: "At 5:15, rifled 80-pounder aft, loaded with 6 pounds powder and solid Dahlgren shot, 80 pounds, burst in the act of firing into four principal pieces. The gun forward of the trunnions fell on deck. One third of the breech passed over the mastheads and fell clear of the ship on the starboard bow. One struck on port quarter. And the fourth piece, weighing about 1,000 pounds, driving through the deck and



The largest gun cast in the world to that date was this 20-inch Rodman gun mounted at Fort Hamilton, New York. It was fired only four times during the war. (Library of Congress)

magazine, bringing up on the keelson, set fire to the ship." A handful of 150-pounders were also produced, but their quality was distrusted, and they never saw actual service.

Loading a 15-inch Rodman gun at Fort Monroe, Virginia. Note that a hoist is used to bring the solid shot to the muzzle, due to the heavy weight of the shot. (National Archives)

Dahlgren himself was concerned about the safety of such large weapons, and ordered their use limited to fire against ironclads, and then with reduced charges. In action, in the turret of the U.S.S. *Weehawken*, a Monitor-class ship, a 15-inch Dahlgren/Rodman gun, firing at full charge behind a 400-pound cored shot, smashed through the armor of the C.S.S. *Atlanta* at 300 yards. Although the *Weehawken* needed to fire only five rounds, with both its 15- and 11-inch guns, the *Atlanta*, having run aground and being unable to bring its guns to bear, was forced to surrender due to the damage done by the large gun. These 15-inch guns, called Rodmans by the army and Dahlgrens by the navy, were also acquired by the army for its forts around Washington and along the seacoast.

The Union Navy also used 6.4-inch and 8-inch Parrott rifles that were essentially the same as the army models.

The Confederates came up with one unique piece of heavy rifled artillery of their own, the Brooke rifle. It was designed by a Confederate Navy officer, John M. Brooke, Chief of the Bureau of Ordnance and Hydrography. It was a cast-iron gun using wrought-iron reinforcing bands around the breech. Different versions had different numbers of bands, ranging from one to three, with two being used on 7-inch to 10-inch guns. Rifling was similar to that of the British-made Blakely rifle, although Tredegar did cast one 7-inch Brooke that they did not rifle or band. In 1862, Tredegar also cast a 7-inch Brooke rifle which it triple banded.

A 7-inch Brooke rifle could send a projectile more than four and a half miles. Many of these weapons were made at Richmond's Tredegar Iron Works, which produced 14 of them between September, 1861, and March, 1862. Their sizes were recorded at 6.4-inch, 7-inch, 8-inch, 10-inch, and 11-inch. Tredegar also described several Brooke rifles that they cast as "32-pounders."

The largest source of Brooke guns, however, was the Confederate Navy itself. It set up its own naval gun foundry in Selma, Alabama, in 1863, casting its first 7-inch Brooke rifle in July, 1863. This gun was not acceptable, and the foundry furnaces were rebuilt. Its next guns were also failures, for various reasons, but by January, 1864, the foundry was able to supply its first 7-inch Brooke rifle to the C.S.S. *Tennessee*. Other Selma-cast Brooke rifles went to land fortifications, such as the defenses of Mobile, Alabama. The foundry also cast 10-inch and 11-inch Brooke guns for harbor defense. Selma-produced Brookes in 6.4- and 7-inch

were rifled, while the 8-, 10-, and 11-inch Brookes were smoothbores. All told, the foundry produced 102 Brooke rifles and guns.

The Brooke turned out to be a very serviceable design, although prone to bursting more through manufacturing flaws than design flaws. On January 9, 1864, General P.G.T. Beauregard wrote Colonel Josiah Gorgas, Chief of Ordnance, the results of experiments in ordnance tried at Charleston, where he commanded: "Gen. Ripley, in one of his reports, makes the following statement:

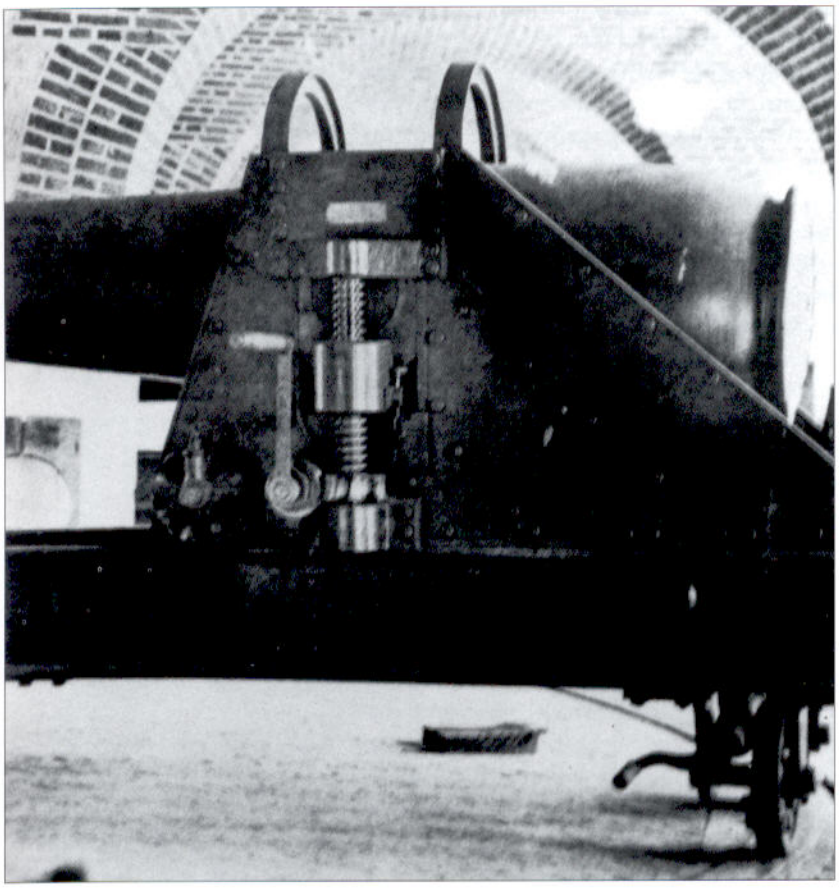
"The Brooke gun at Fort Sumter was fired with 15 pounds of powder at 18 degrees elevation, and although the charge was less than the maximum it finally cracked through the vent, and the gun was condemned. Happening to be present I ordered a reduction in using the remaining gun of the same kind, and better ranges were obtained with 10 pounds of mixed coarse-grained and common cannon powder.

"With 20 1/2 degrees a shell of 100 pounds was thrown 4 miles into the enemy's camp, and with 23 degrees it was thrown beyond Light-House Inlet and on Folly Island."

Major-General Dabney Maury, in writing of the defense of Mobile, noted: "But we had some cannon better than any Parrott had ever made. They were the Brooke guns, made at Selma in the Confederate naval works of the iron from Briarsfield, Alabama the best iron for making cannon in the world.

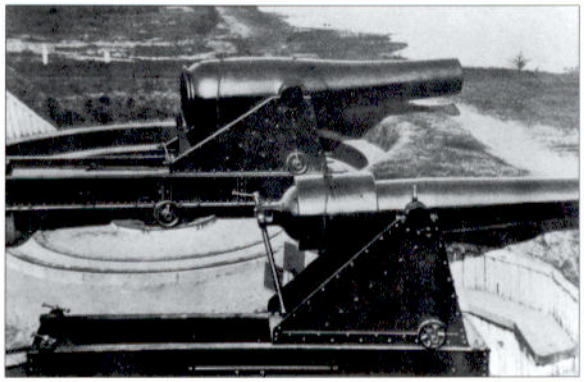
"Our Brooke guns at Mobile were rifles, of 11 inch, 10 inch, 7 inch and 6 4/10 inch calibers. They outranged the Parrotts, and, though subjected to extraordinary service, not one of them was ever bursted or even strained."

Even so, as with all big guns, Brookes were not immune to premature explosions if incorrectly used. Colonel William Lamb, commander of Fort Fisher, wrote that during the final attack on his fort: "My two seven-inch Brooke rifles both exploded in the afternoon of this day. Being manned by a detachment of sailors and situated opposite to the bar, I had given the officer in charge discretion to fire upon the vessels which had approached the bar, and his fire had been more rapid than from any other guns, and with the disastrous result of explosion, which unfortunately wounded a number of men."



An experimental carriage for a Rodman gun tested at Fort Monroe, Virginia. The idea was to make for easy and accurate elevation. The system was never adopted. (Library of Congress)

Major Manigault noted on September 19, 1863: "Commended firing ... with 4.62 in. Rifle No. 1. Fired 7 Shots with good effect when the rear Band of the piece showed symptoms of Starting from the one in front of it and the black, semi-liquid unctuous residuum from inflamed gunpowder oozed out from between the bands. Ceased firing from this gun, which must now be regarded as positively dangerous, and unfit for use. (Total Number of Shots fired from it by us 261, at an average elevation of 13 ½ degrees, 4 lbs of Powder, and Average Weight of projecting probably 27 or 28 lbs.) The Vent is very much enlarged and quite ragged." This weapon, judging from the description of the "bands" was probably a Brooke rifle.



A Parrott rifle, front, and a Rodman gun, behind it, in Battery Rodgers, overlooking the Potomac River in Alexandria, Virginia. (Library of Congress)

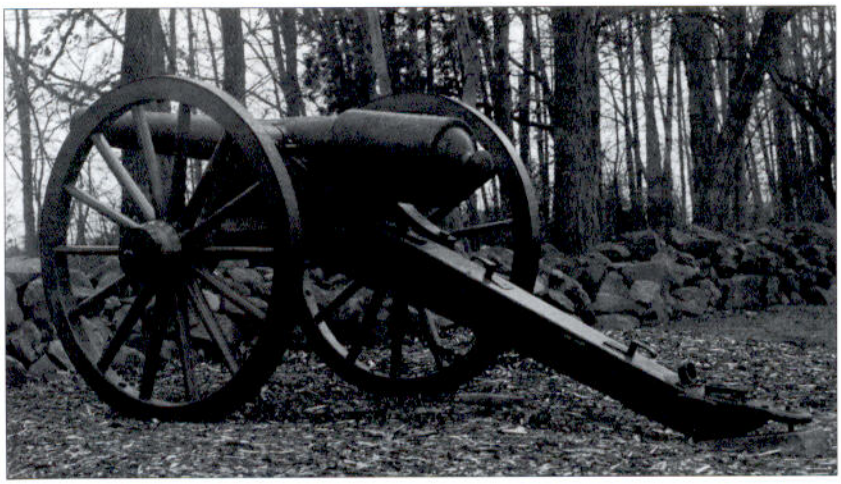
BRITISH-MADE GUNS

Great Britain made the most advanced artillery available in 1861 and the Confederates, since they were unable to make as many guns as they needed for themselves, took advantage of British technology by buying as many guns as possible from overseas. Early in the war, the Confederate War Department sent Caleb Huse as its purchasing agent to London.

On the subject of British-made heavy artillery, Huse wrote the War Department in Richmond on May 21, 1861: "I have in my possession detailed drawings of the Armstrong gun, which I shall copy and forward by the first opportunity. I shall also be able to send with these full descriptions of the mode of manufacture, as given by Sir William [G. Armstrong] himself, and drawings of his fuse ... There seems to be no doubt, however, from the inquiries I have made, that the British Government has entire confidence in the Armstrong gun. To the large guns there appears to be some objection."

Furthermore, he wrote: "I have met Capt. Blakely and have conversed with him about his gun. As yet I have failed to see anything in his principle which would cause me to purchase his cannon. He uses the same principle that Armstrong employs of wrapping an interior core with wrought-iron spirals and in fact he claims the merit of the invention. The chief difference appears to be that Capt. Blakely uses a cast-iron core, while Sir William has a wrought-iron centerpiece. The Northern States have purchased some Clay breech-loaders, I am informed, at enormous prices. From the accounts I have received of them, and from a cursory inspection of one, I should think the men about the breech would stand a little better chance than the enemy, but that the difference would be very slight. I am told that they were invoiced as Armstrong guns. The true Armstrong cannot be had. I think, however, that they can be manufactured from the drawings which I shall send to the Department."

Confederate ordnance officers were told that Clay wanted £400 [$2,000] for an 8-inch gun and £500 [$2,500] for a 9-inch and, despite the cost, ordered at least one for testing. Recalled E. Porter Alexander: "A few of the favorite English rifled guns were brought through the



A 20-pounder Parrott rifle, the smallest piece of artillery considered "heavy artillery." (Gettysburg National Battlefield Park)

blockade, and used in the Army of Northern Virginia, comprising the Clay, Whitworth, Blakely, and Armstrong shunt pattern. The Clay gun was a breech-loader, and was called an improvement upon the breech-loading Armstrong, which was manufactured for the English Government only, and could not be obtained. Its grooving and its breech-loading arrangements appeared simpler and of greater strength. On trial, however, it failed in every particular. Every projectile fired 'tumbled' and fell nearer the gun than the target, and at the seventh round the solid breech piece was cracked through and the gun disabled."

That left the Blakely and the Armstrong, which was not available since the British Government had an interest in Armstrong's company until 1862. Thereafter, his guns became available to the South. Charleston citizen Joseph Walker wrote on October 24, 1863, to Charleston's commander, General P.G.T. Beauregard: "During my recent visit to Europe, from where I have just returned ... I gained some information about guns, in my investigation, that I thought might be of some importance, and have transmitted the facts to Col. Gorgas, at Richmond.

"The main facts are these: That ten guns of 9-inch and ten guns of 11- inch cast-steel, of the Blakely pattern, can be had immediately. They are a good gun, and will penetrate two plates, each of 4 inches thickness.

"Second: That the Armstrong gun can be gotten, through a friend, in any number. Sir William Armstrong does not wish his name to appear, in consequence of his relations to his own Government."

In fact, the Confederates purchased both weapons, two Blakely rifles arriving in Charleston in September, 1863. Colonel William Lamb, commander of Fort Fisher, described his North Carolina post: "The land face mounted twenty of the heaviest seacoast guns, and was 682 yards long; the sea face with twenty-four equally heavy guns (including a 170-pounder Blakely rifle and 130-pounder Armstrong rifle, both imported from England) was 1,898 yards in length."

The Armstrong was produced from wrought-iron tubes made from spiral coils welded into a single bar as bands formed around a mandrel. Steel replaced wrought-iron for the main tube by the end of 1864, although the rest of the weapon was made of these bands formed around the mandrel. Additionally, the first Armstrong guns were breech-loaders, but these failed, and after early 1863 the company made all its guns as muzzle-loaders. The weapons were "shunt rifles," a process that used a small number of grooves in the barrel and ammunition with matching rows of zinc strips (later brass studs) to engage the grooves. The 150-pounder Armstrong rifle used at Fort Fisher was a breech-loader mounted on a British barbette carriage that featured six traverse wheels

and side compressors, something not seen on American-made carriages.

Blakely guns were made of cast iron with wrought iron or, more commonly, steel breech bands. They were produced by various British makers, including Fawcett, Preston & Co.; Low Moor Iron Co.; George Forrester & Co.; and Blakely Ordnance Co., and sold to various foreign powers, including Russia, and to Massachusetts, which bought eight 9-inch and four 11-inch models during the war. The 9-inch fired a 248-pound bolt, using a 30-pound charge. The 11-inch fired a 375-pound bolt with a 37.25 pound charge. A 4.5-inch version was used at Fort Pulaski, while 7.5-inch versions were used by the Confederates at Vicksburg and in northern Virginia. Two 8-inch, 200-pounder Blakelys were in the defenses of Mobile, Alabama, while the two Charleston guns were 12.75-inch. The latter were the largest rifled guns in the Confederate arsenal.

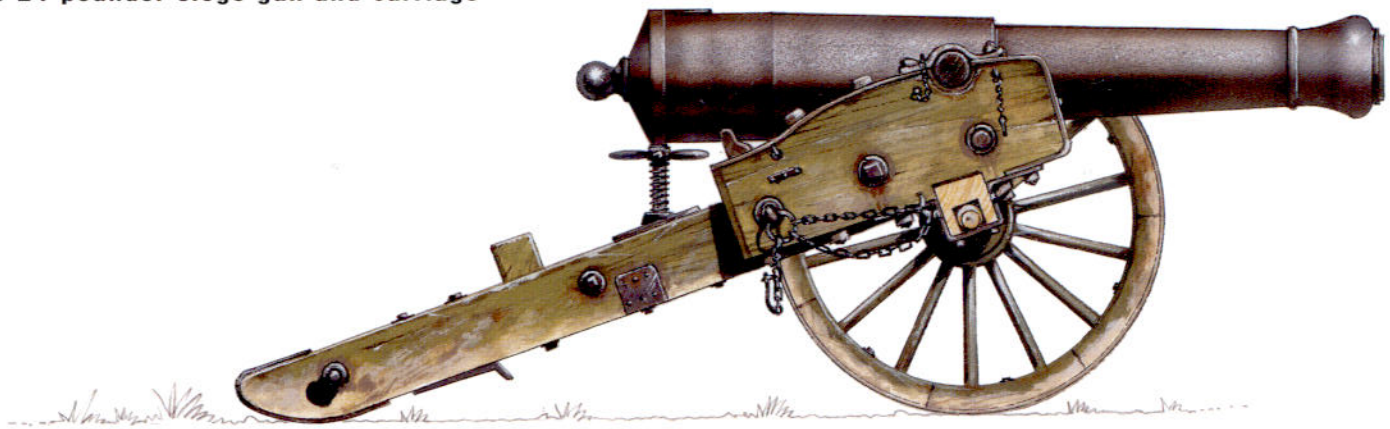
Major Edward Manigualt reported from the defenses of Charleston in September 1863, that his crew, "Fired also 4 Shell with the 4 in. Blakely Gun. The results were unsatisfactory. The projectiles flew very wildly. Elevations 13°, 14°, 15° & 16 ½°." Again, on September 21, he wrote: "In afternoon fired 6 Shots with 4 inch Blakely gun at Black Island. The results very unsatisfactory. We can make nothing of this gun with the projectiles furnished us."

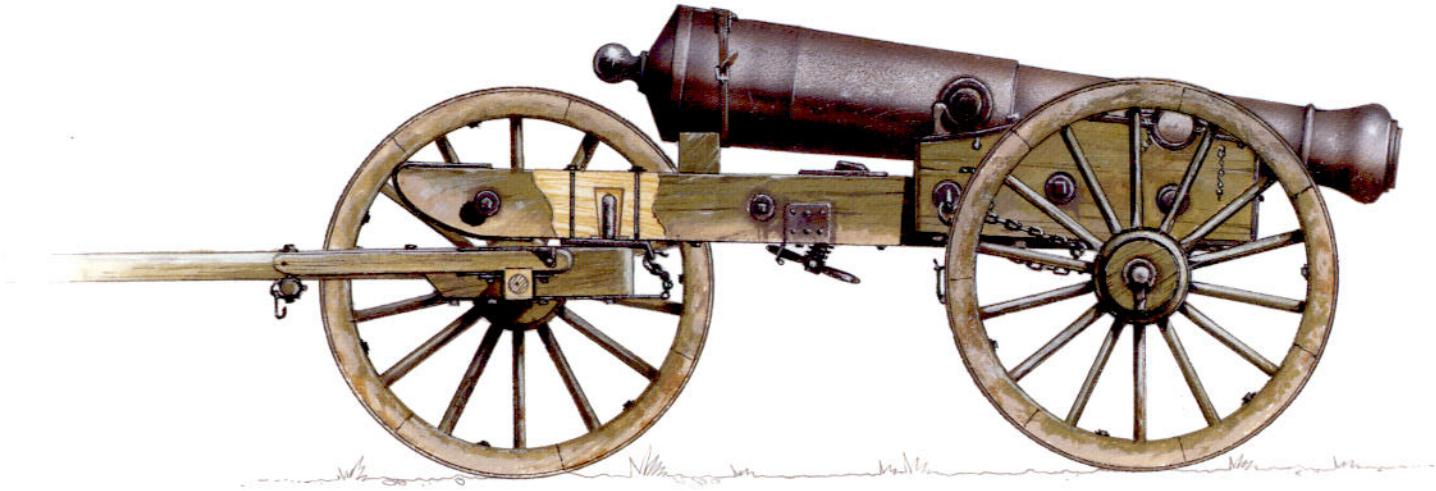
Even so, Charleston's defenders wanted even bigger Blakely guns, and ordered two 12.75-inch Blakely guns for that post. Made of cast iron with a bronze air chamber at the breech, with a steel band around the powder chamber, they weighed almost 50,000 pounds each and each special carriage with all accessories weighed 58,000 pounds. Each solid cylindrical shot was 20 inches long and weighed 650 pounds. The powder charge for the bolt was 50 pounds and shells weighed 470 pounds. Due to their weight, the weapon had a small hoist on the top of the barrel that allowed the shot to be raised to the muzzle. The gun used a huge four-wheeled top carriage that allowed the weapon to be loaded, and then moved up the bottom carriage into firing position. The recoil shoved the top carriage back after firing. Sliding friction against the bottom carriage reduced strain on carriage and gun.

Once loaded, the charge was rammed against the reinforced breech, but not into the bronze chamber which was to remain free to serve as an air-filled shock absorber. Then a projectile was placed in the lifting mechanism and cranked to the muzzle. The shell or bolt flanges had to be aligned to the rifling by hand and then the shot was rammed in until snug against the cartridge. The gun would then be moved forward, aimed with two vertical gunsights and a

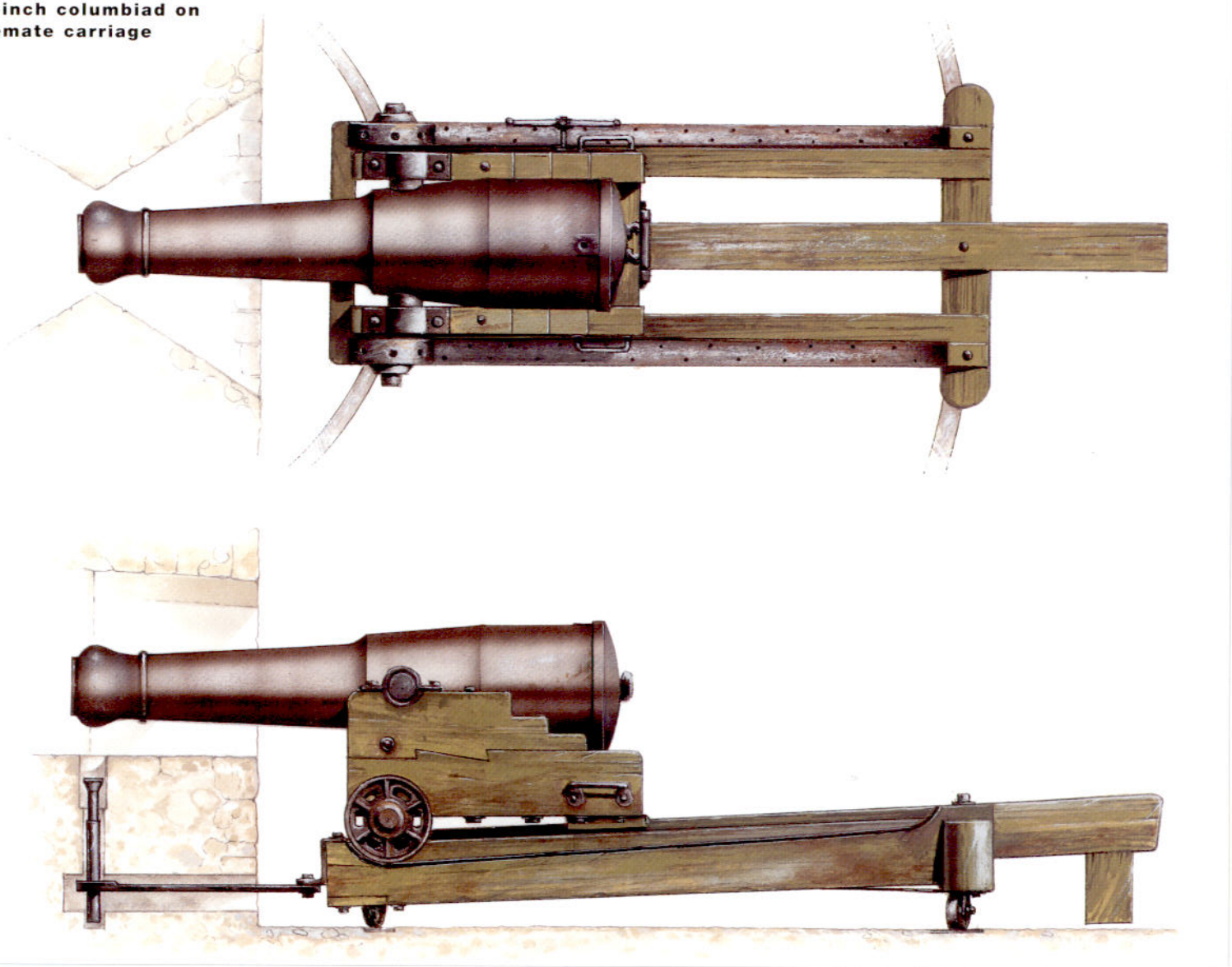
Parrott rifles at Battery Meade, Morris Island, during the firing into Charleston. (Library of Congress)

A: The 24-pounder siege gun and carriage

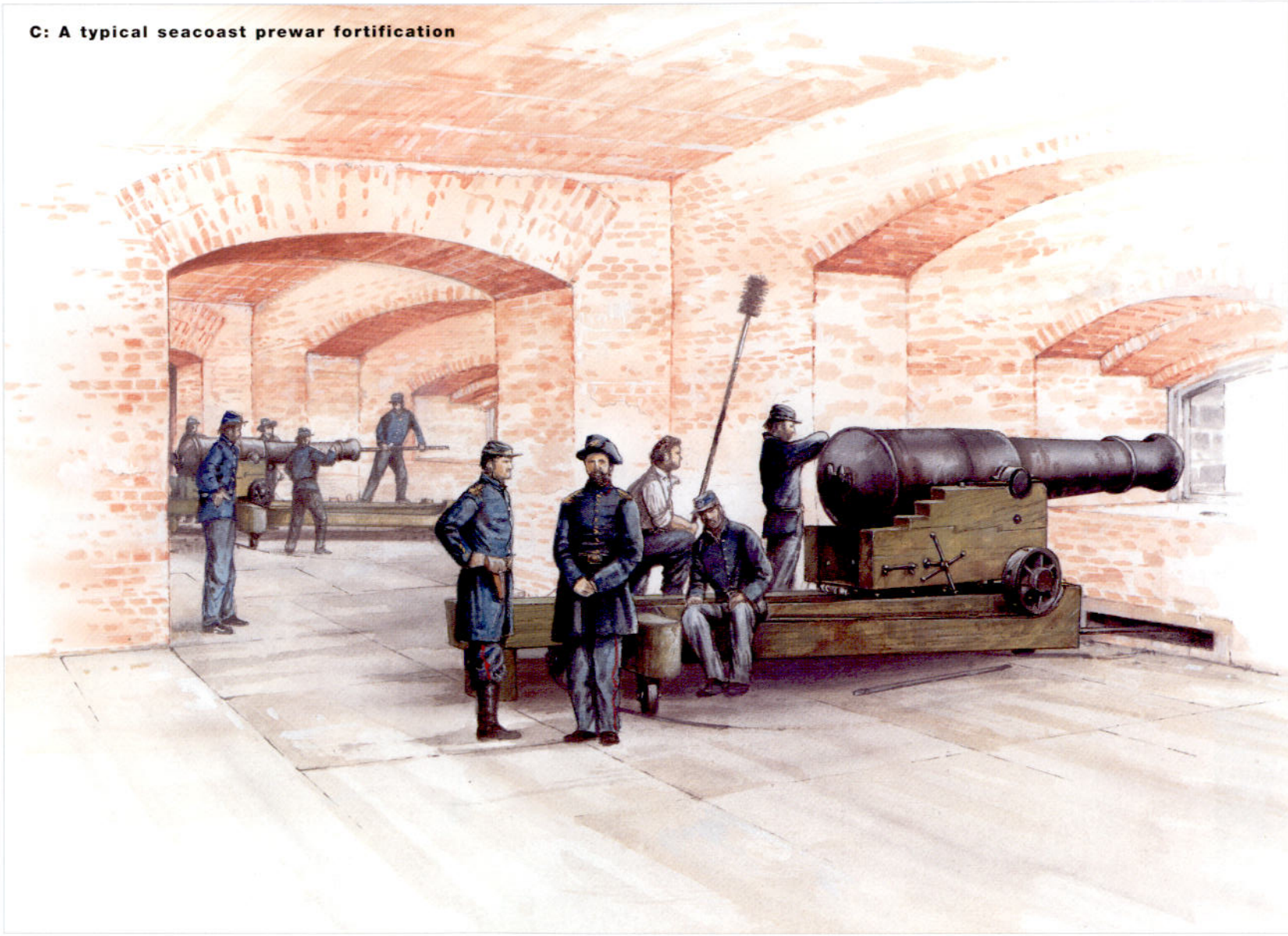




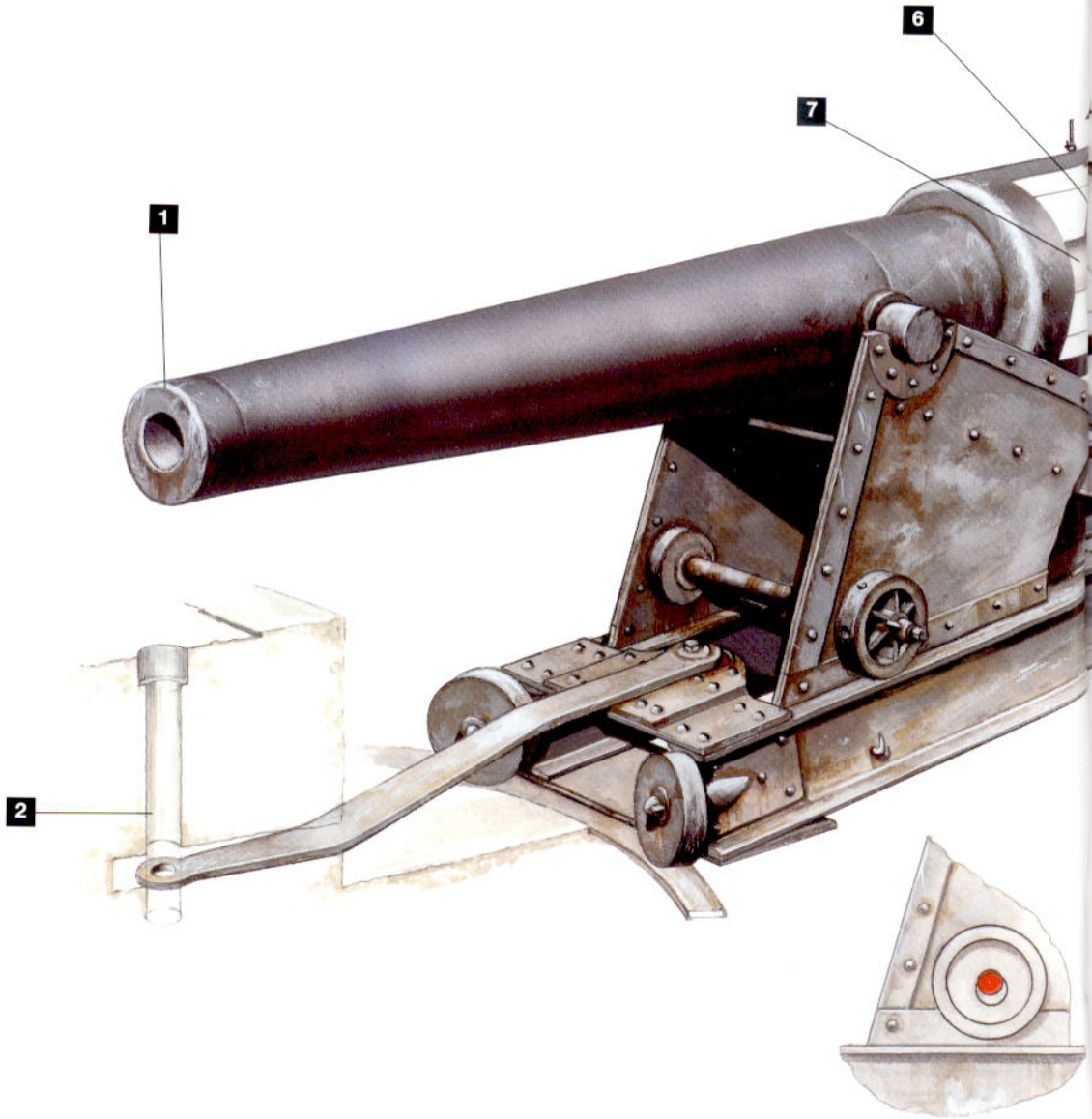
B: The 8-inch columbiad on a casemate carriage

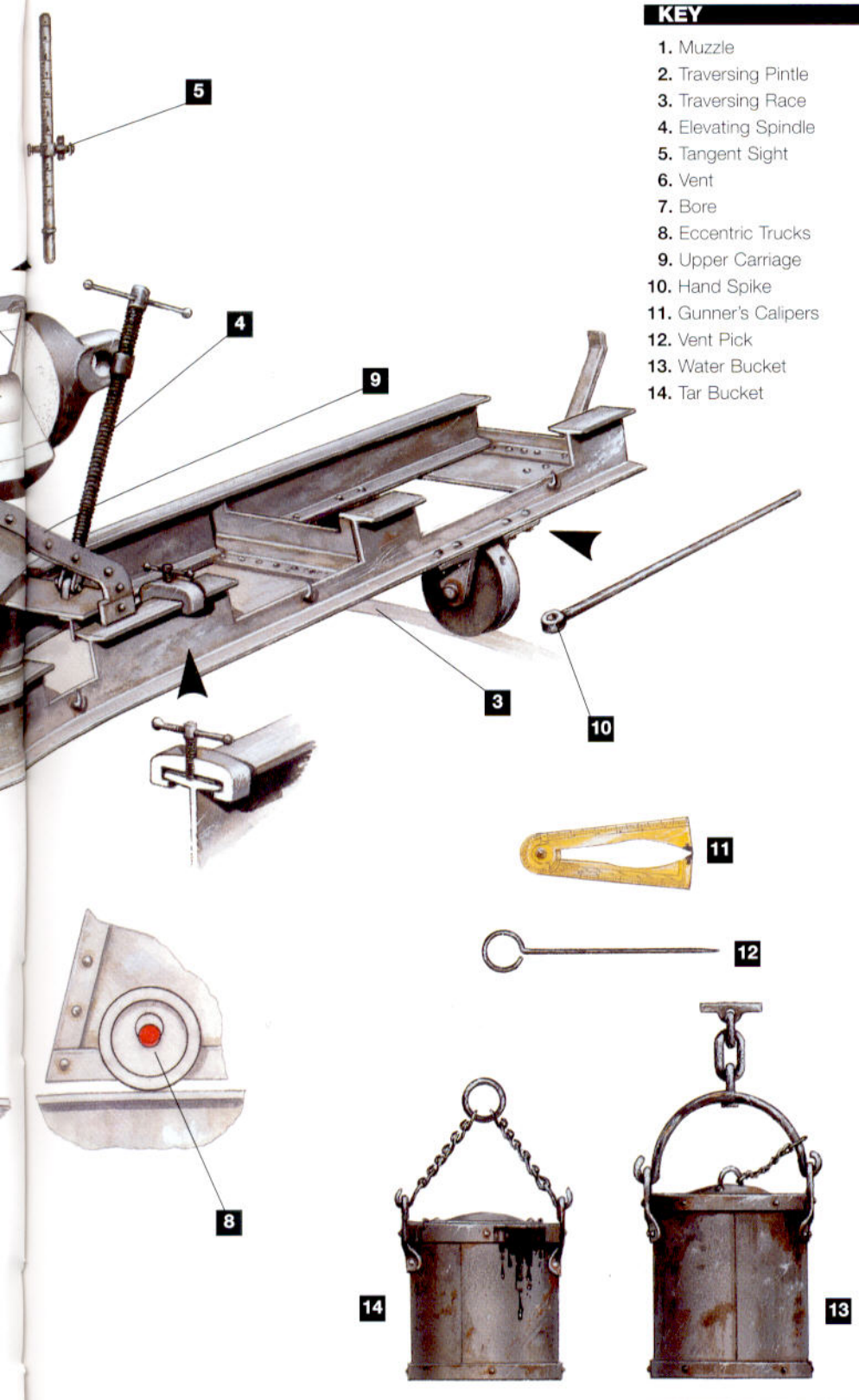


C: A typical seacoast prewar fortification



100-PDR. PARROT RIFLE ON IRON CASEMATE CARRIAGE

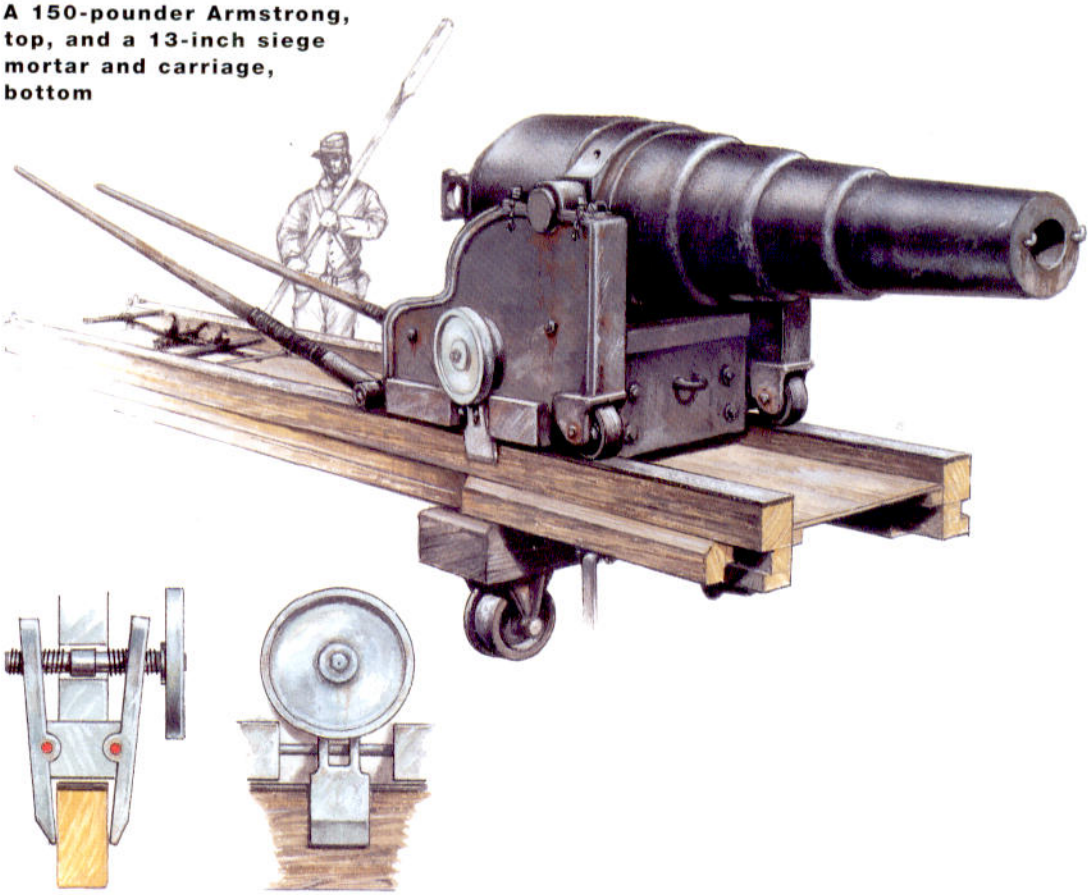


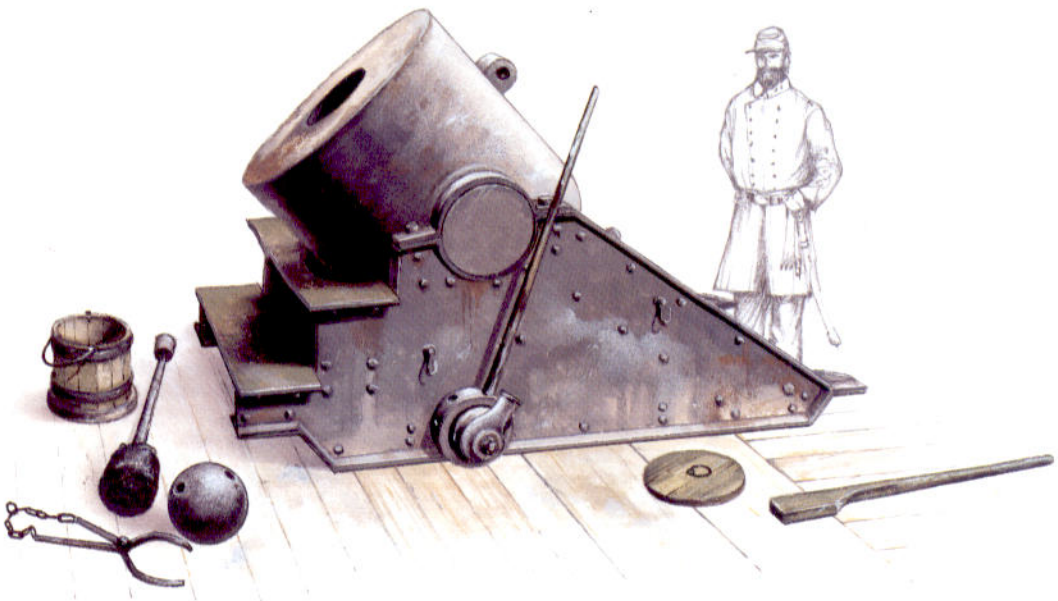


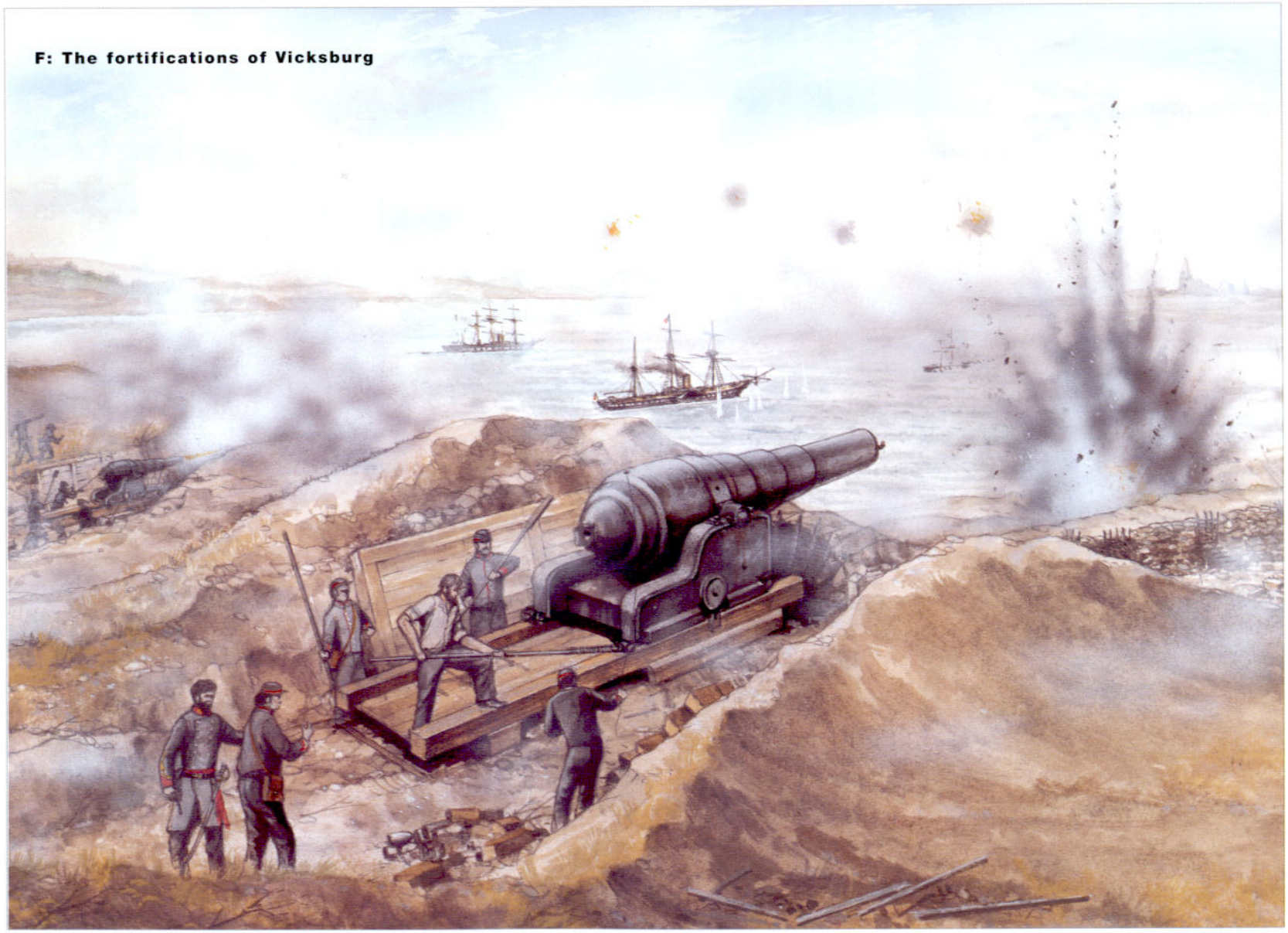
KEY

1. Muzzle
2. Traversing Pintle
3. Traversing Race
4. Elevating Spindle
5. Tangent Sight
6. Vent
7. Bore
8. Eccentric Trucks
9. Upper Carriage
10. Hand Spike
11. Gunner's Calipers
12. Vent Pick
13. Water Bucket
14. Tar Bucket

E: A 150-pounder Armstrong, top, and a 13-inch siege mortar and carriage, bottom

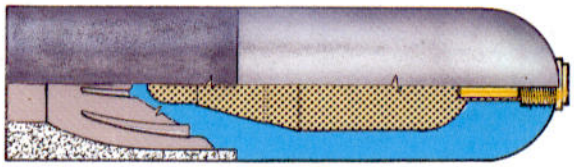





F: The fortifications of Vicksburg

G: Ammunition

A



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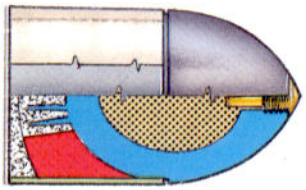

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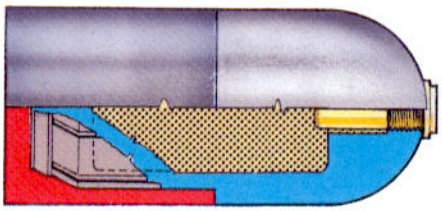

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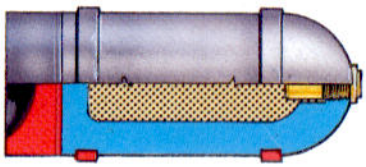

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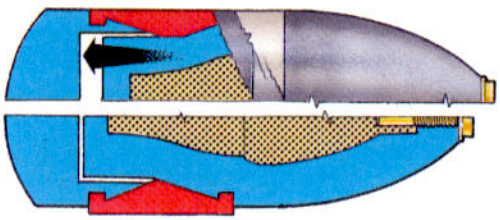

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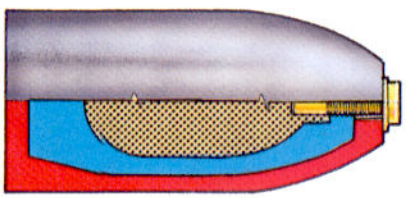

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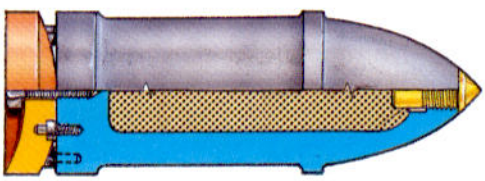

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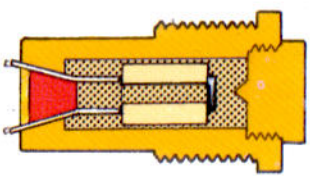


A Parrott rifle in the fortifications around Fort Stevens, Washington, DC, where President Abraham Lincoln actually came under fire during the Confederate raid on the city in 1864.

screw jack. A pointer on the right trunnion indicated the degrees of elevation. Then the lanyard was pulled and the weapon fired. Loading and firing was a slow operation.

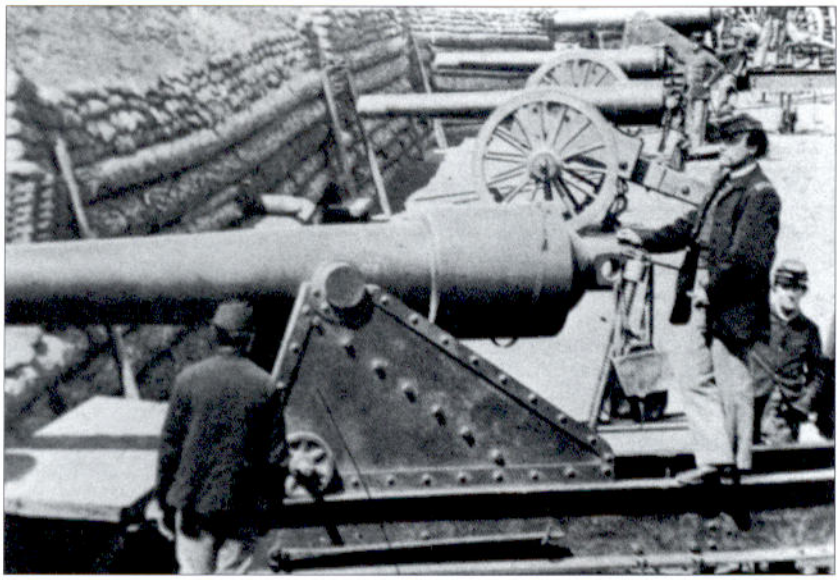
Placed in position, the Charleston guns were tested before artillerymen received the necessary instruction manual. The novice gunners, not understanding the purpose of the air chamber behind the breech, loaded three charges into the air chamber and another in the breech. The incorrect loading ruptured the chamber, cracking the cast-iron breech in 11 places. Confederate ordnance reported on October 3, 1863: "The bursting of the heavy rifled guns is not sufficiently explained by the character of the metal, as Gen. Beauregard supposes. The cast iron of these guns was entirely satisfactory, and their premature destruction is due to the constant heavy charges with which they have been fired. But the same excuse cannot be made for the bursting of the 600-pounder imported Blakely gun. The destruction of this formidable gun was due to a want of forethought, unpardonable in an officer as experienced as Gen. Ripley, as appears from the following telegram, just received from Capt. Harding (October 3), as to remaining gun:

"Col. Yates yesterday fired large Blakely gun with charges from 30 to 55 pounds powder, 470 pound shell, with perfect success; elevation, 2 degrees; gave range 1 ¼ miles; cartridge in front of brass chamber." Thus the second gun, correctly loaded, proved a success. Local mechanics repaired the breech of the first gun and got that back into service.

The Confederates also purchased one other type of British-made rifle, the Whitworth 70-pounder (5-inch), as well as smaller 12-pounders (2.75-inch), some of which ended up in fortifications such as Fort Fisher. Several of these 70-pounders were later captured by Union blockaders, and then used against the Confederates around Charleston. Confederate E. Porter Alexander recalled in 1866 that Whitworths "often rendered valuable service by their great range and accuracy. They fired solid shot almost exclusively; but they were perfectly reliable, and their projectiles never failed to fly in the most beautiful trajectory imaginable. Their breech-loading arrangements, however, often worked with difficulty..." Union experts around Charleston, however, disliked the 70-pounders, finding them prone to premature explosions when

firing shell, difficult to operate since the projectile tended to wedge halfway into the breech, and inaccurate compared to 8-inch Parrotts.

Confederates generally held their British-made, breech-loading guns in reserve, because of the cost of the ammunition. As Fort Fisher's Colonel Lamb recalled: "The Armstrong gun had only one dozen rounds of fixed ammunition, and no other projectile could be used in its delicate groves." However, when they were fired, they proved worth their cost. In reporting on a Union assault on Fort Fisher, North Carolina, Lamb noted: "About 2 p.m. the flagship and other frigates came closer to the bar and lowered boats, which approached to sound the bar. The Brooke gun battery opened upon them, with other guns, and drove them out. The Armstrong gun, which had been held in reserve during the fight, was pointed late in the afternoon on the flagship lying off the bar, and one steel shot amidships caused the admiral's pennant again to withdraw."

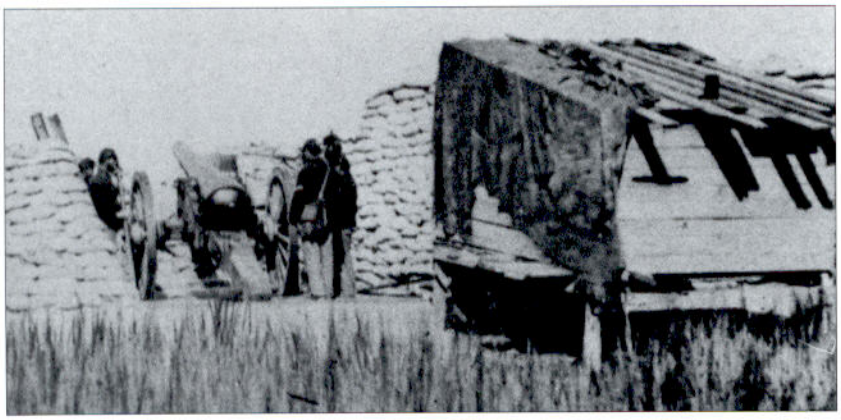


Parrott rifles at Fort Brady, one of the ring of forts around Washington, DC, manned by members of Co. G, 1st Connecticut Heavy Artillery. (Library of Congress)

Nonetheless, all the British-made rifles presented problems because they required ammunition beyond Southern manufacturing capabilities. As Alexander recalled: "The Blakely guns were twelve pounder rifles, muzzle loaders, and fired very well with English ammunition ('built up' shells with leaden bases), but with the Confederate substitute, they experienced the same difficulties which attended this ammunition in all guns."

AMMUNITION

A brief examination of period heavy-artillery ammunition alone could more than fill two books this size. Basically, period ammunition included solid shot, shells, canister, and grape. Shells came in a variety of styles, including shells that had a brass, iron, copper, or lead cap or ring attached to their base (Parrott, Absterdam, Read, Cochran, Dimick, Mullane, Burton and Archer, Harding); shells with lead or paper around the outside that squeezed into the grooves on firing (Schenkl, Dyer, James); shells that were shaped to fit a specific bore (Whitworth, Armstrong); shells with projections that fit into the bore grooves (Sawyer, Blakely, Pattison, Dahlgren); and shells with a soft metal covering that was driven into the grooves on firing (Sawyer, Hotchkiss, Burton). The Confederates also produced a winged shot that came with slotted wings that sprang open on leaving the muzzle in an attempt to obtain rifled accuracy with smoothbore guns.



One of the largest Parrott rifles ever made was nicknamed "the Swamp Angel" and was placed to fire into Charleston. It burst after only a few rounds, the men having taken months to get the ground in the swampy area hard enough to stand the weight of the gun. (Library of Congress)

For anti-personnel use, siege guns used grapeshot, which had been replaced by canister for field artillery use. According to Colonel Scott, grapeshot consisted of: "a certain number of cast-iron balls put together by means of two cast-iron plates, two rings, and one pin and nut." Grapeshot provided to 8-inch guns was made up of 6-pounder shot.

Cored shot, as used in some naval guns as well as Parrotts, was designed to be used against masonry forts. Some Parrott shells were filled with six pints of Berney's incendiary composition, a mixture of turpentine and petroleum, or a pint of Flemming's composition. This ammunition was designed to set wooden buildings alight upon exploding.

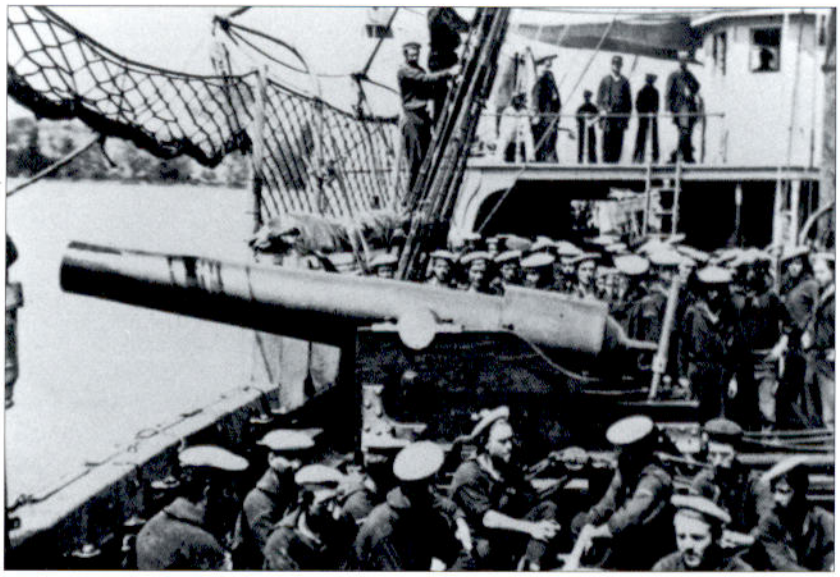
Northern-made Stafford armor-piercing ammunition was designed for use against ironclads. It featured a steel bolt cased in wood with a brass sabot at the rear. The bolt would drive through the armor, while the wood casing would fall apart on the face of the armor. These came in 6.4-inch and 8-inch sizes.

Southern-made ammunition was universally condemned, save, perhaps, by its targets. Confederate Major Edward Manigault noted on August 29, 1863: "After a good many shots found that the 24 pndr. Rifle could not be relied on at that distance with the new shell furnished us. The Shells made by J.M. Easton & Co. (a Charleston machine shop and foundry) according to a pattern which was furnished with the original Blakely Gun sent to this country (Prioleau Gun) reached Morris Island, but they have all been expended and the other shells furnished cannot be relied on at all and have all fallen short. [This Blakely gun was presented to South Carolina by Charles K. Prioleau of Frazer & Co. in 1861.]"

A Parrott rifle mounted on a well-defended railroad car during the siege of Petersburg. (Library of Congress)

Manigault wrote again on September 8, 1863: 'I have to complain of the character of the Rifle projectiles lately furnished me. As for instance, Solid Conical Shot for 4.62-in. Gun, weighing 40 lbs. = 3 1/2 times the weight of Spherical projectiles of same caliber. Shell for 24-pndr Rifle (5.82-in. Cal.) weighing 60 lbs. = 2 1/2 times weight of solid spherical shot of same Caliber. Solid Conical Shot

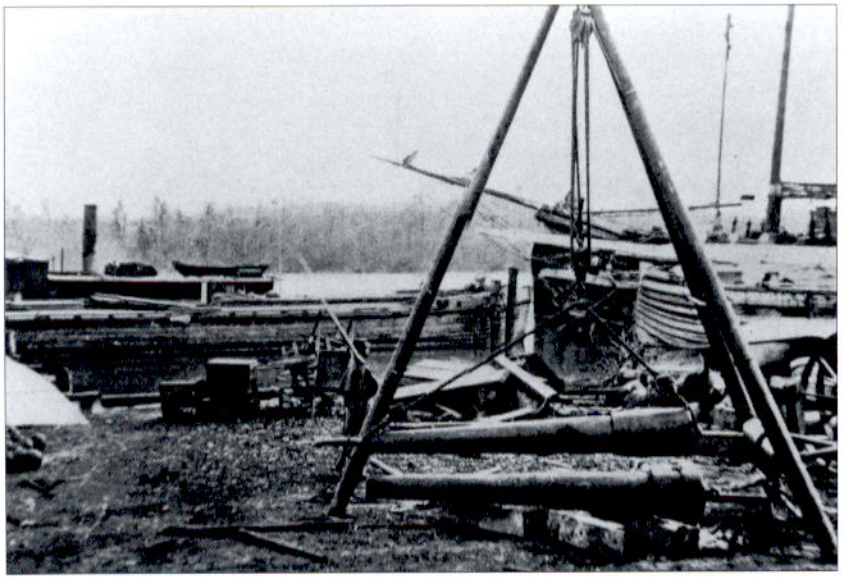
of 80 lbs weight - 3 ½ times weight of solid Spherical shot of Same diameter. And this last for a gun not originally intended as a Rifle, but simply converted by Rifling & Banding. Not only will the guns be enormously strained by these projectiles fired at high Elevations and soon burst, but also, with smaller charges than 10 lbs. & 5 lbs. of powder, respectively for the 5.82- and 4.62-in. Calibers, the Range will not be great. If great penetration were required at distances of from half a mile to 1 mile then these heavy solid shot might be suitable, but They are entirely unsuitable for a Range of 2 ½ miles, which is required for Morris Island (at least without increasing the Charge of Powder to an extent extremely dangerous with any guns we have)."



The Navy mounted 100-pounder Parrotts such as this one on the U.S.S. *Mendota*. (U.S. Army Military History Institute)

The damage done by both shells and solid shot depended largely on where they landed. Soft soil and sand, for example, would absorb the shell and most of its power would be lost, while hard soil would allow the shell to explode all around and shot to ricochet. Major Frederick Shonnard, 6th New York Heavy Artillery, wrote after watching a mortar shell land in sandy soil at the feet of one of his men: "A soldier was walking in towards me from the picket line, suddenly as I looked at him a shell dropped right at his feet burying itself in the sandy soil, in another instant the shell exploded and lifted him off the ground. Calling some of my men to follow, I jumped over our work and ran to him. To my amazement I was unable to lift him; the explosion had forced sand into and under his clothing so that he was as heavy as if made of stone. Men coming up opened his clothing and relieved him of sand sufficiently so that they could carry him. He was unconscious but finally when he regained his senses it was made plain that he was not hurt in any way. The shell had buried itself in the deep sandy soil before exploding."

Forts that guarded the seacoasts were provided with furnaces for heating shot to be fired into wooden ships so that they would catch fire. Each furnace was designed to hold 60 or more shot. When users put shot into a cold furnace and started its fires, it would take an hour and a quarter to heat shot red hot. After the furnace was heated, a 24-pounder shot could be heated red hot in 25 minutes, while 32-pounder and 42-pounder shot took only a few minutes longer. It took a crew of two to three men to keep a furnace going and put cold shot in and take hot shot out during normal operations. One man took out the shot hot and placed them on a stand to be scraped; another scraped them and put them into a ladle for carrying them to each gun, while the third supplied cold shot and fuel to the furnace.



Tripods were used to mount 100-pounder Parrotts on their carriages. (Library of Congress)

A wadding of either pure clay, fuller's earth, or wet hay was rammed between the charge and the hot shot to prevent premature explosions. According to period experiments, a red-hot shot retained enough heat to set wood alight even after ricocheting off the water a couple of times. After hitting the ship, the shot worked best if it penetrated only ten to 12 inches, because a ball that went deeper could not get enough air to flame the embers. Therefore, ordnance officers advised using only a quarter to a sixth charge when firing hot shot the same distance as one would use to fire cold shot.

Cannonballs themselves were actually placed in piles near their guns. According to the ordnance manual, "Balls are piled according to kind and caliber, under cover if practicable, in a place where there is a free circulation of air, to facilitate which, the piles should be made narrow if the locality permits; the width of the bottom tier may be from 12 to 14 balls, according to the caliber." So that gunners could quickly identify the correct ammunition to use, solid shot for 8-inch guns and all spherical case shot were painted red, while all other cannonballs were painted black. Grape and canister shot were either oiled or painted and stored either in piles or in strong boxes marked with the contents.

HEAVY ARTILLERY USAGE

The main purpose of heavy artillery was to defend and attack fixed fortifications. These fortifications were made of brick, stone, and mortar along the coast and, where newer fortifications were especially created to match the occasion as at around Washington or Richmond, of earth and sand bags. In fact, the newer fortifications did better under fire from the heavy guns then available.

The siege of Fort Pulaski, Georgia, was a test of all types of heavy artillery of the period. The fort, defending the approach to Savannah along a river leading into the city, was a single-story pentagon-shaped brickwork with a line of guns inside and a line *en barbette* (meaning exposed on the top of the fort's walls). Its construction had begun in 1829 and by 1847 it could be said to be only "nearly complete." Essentially it, as were the other fortifications along America's seacoast, had been designed to withstand smoothbore artillery of the Napoleonic era. Its armament was to consist of 150 guns, none larger than a 32-pounder, of which there were 65, and which was still the heaviest gun in its garrison in 1860. By November, 1862, it had, *en barbette*, five 10-inch

columbiads, six 8-inch columbiads, and two 10-inch mortars. The casements contained three 8-inch columbiads, two 42-pounder guns, 20 32-pounder guns, and one 24-pounder gun. Later, the Confederates were able to add imported British-made Blakely 24-pounder rifled guns to this garrison.

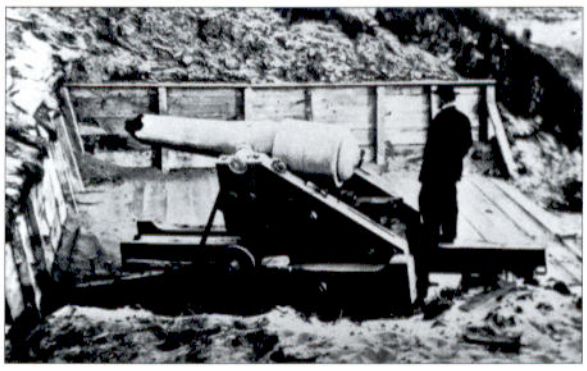
In May, 1861, British correspondent Lord Russell visited the post, which he thought was ill-suited for the day, noting that the Confederates "do not understand the nature of the new shell and heavy vertical fire, or the effect of projectiles from great distances falling into open works." The Confederates, however, felt that no siege artillery could smash through the fort's brick walls from the distances at which they would have to be placed.

Large Parrott rifles were prone to premature explosions which could hurl heavy chunks of metal some distance, such as on this gun photographed in the Union lines besieging Charleston, South Carolina.

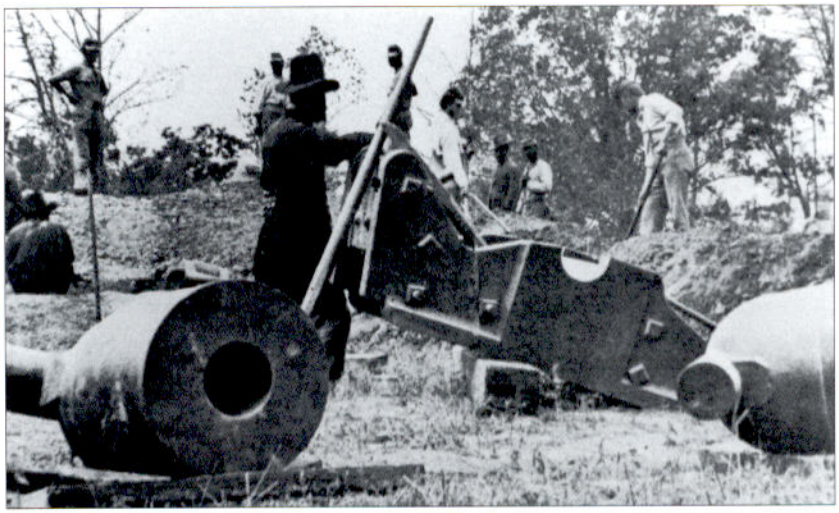
The Union forces planned to take Fort Pulaski, the main defense of Savannah, as an entrance into Georgia. The chief engineer planning the siege called for a force of ten 10-inch mortars, ten 13-inch mortars, eight heavy rifled guns, and eight columbiads. These were to be placed in batteries ranging from 2,600 yards to 3,700 yards from the fort. In fact, 36 Union guns were to take part in this siege. These were placed as follows: three heavy 13-inch mortars at 3,400 yards from the fort; three heavy 13-inch mortars 3,200 yards away; three heavy 10-inch columbiads 3,100 yards away; three heavy 8-inch mortars 3,045 yards away; one heavy 13-inch mortar 2,750 yards away; three heavy 13-inch mortars 2,650 yards away; two heavy 13-inch mortars 2,400 yards away; three 10-inch columbiads and one 8-inch columbiad 1,740 yards away; five 30-pounder Parrotts and one 48-pounder James rifle, which had been rebored from a 24-pounder, 1,670 yards away; two 84-pounder James rifles, rebored from 42-pounder smoothbores, and two 64-pounder James rifles, rebored from 32-pounder smoothbores, 1,650 yards away; and four 10-inch siege mortars 1,650 yards away.

On April 10, 1862, the Union forces opened fire on the fort. At first the Union shelling seemed to their observers to have little effect. Confederate return fire was also ineffective, most of the shells falling short into the river or sinking into the marshes and exploding uselessly. Inside the fort, however, things were not going well at all. The rifled shells, particularly from the James rifles, blasted brick dust everywhere. Within three hours, three casement guns were disabled. That evening, the Confederate commander examined his post and found, "It was worse than disheartening, the pan-coupe at the southeast angle was entirely breached while above, on the rampart, the parapet had been shot away and an 8-inch gun, the muzzle of which was gone, hung trembling over the verge. The two adjacent casemates were rapidly approaching the same ruined condition; masses of broken masonry nearly filled the moat, as was the interior of the three casemates where the dismounted guns lay like logs among the bricks."

The muzzle was blown off this 300-pounder Parrott rifle in Battery Strong, part of the ring of Union force facing Charleston. It exploded on its 27th round, losing some 20 inches of tube. The tube was then cut down and fired another 371 rounds before more cracks around the muzzle forced the gun's retirement.



The Parrott guns were concentrated on exposed Confederate guns, and it was later seen



The Union position at Crow's Nest at Dutch Gap, during the Petersburg campaign, is outfitted with 10-inch mortars. (Library of Congress)

that 10 percent of Parrott projectiles tumbled end over end.

Firing continued through the night and into the next day, and by late morning the Union observers noted that several casemates had been entirely opened, in a hole big enough for a two-horse wagon, and the moat had been almost filled with bricks, masonry, and gun parts. By the end of the day, it was clear that defense was impossible, and the Confederates surrendered. The Union guns had been firing continuously for 18 hours before the surrender.

During the two-day bombardment, Union forces fired 1,394 shot and 3,923 shells for a total of 5,317 rounds. In all, 1,732 were mortar rounds, 1,250 were fired from columbiads, 1,024 were James rounds, and 1,311 were fired from the Parrotts. Close examination showed that a single 84-pounder James shell, fired at 4 ½° with an 8-pound charge, penetrated 26 inches of masonry. A 30-pounder Parrott shot penetrated 18 inches. A 128-pound solid shot from a 10-inch columbiad penetrated 13 inches; a 68-pound shot from an 8-inch columbiad penetrated 11 inches. A 42-pounder shot dug up to 12 feet into the earthen traverses between the guns *en barbette*. In all, 58 percent of the shot that penetrated the fort's walls was fired by rifled guns, with the rest from smoothbores. The result was a breach 30 feet wide with an adjacent scarp wall that was severely damaged across three casemates. In all, 110,643 pounds of metal had been fired at this point to do so much damage.

Clearly, rifled pieces did the most damage, and most observers felt that they won the day. The smoothbore contribution was relatively small, and had the besieging force had only columbiads and mortars, the siege would have gone on a great deal longer. The chief engineer at the siege calculated that heavy smoothbore guns would have been effective if closer than 700 yards from the fort, but beyond that range rifled guns were vastly better in breaching masonry walls. According to him: "... good rifled guns, properly served, can breach rapidly at 1,650 yards distance. A few heavy round shot, to bring down the masses loosened by the rifled projectiles, are of good service."

Mortars were of little value. Only 10 percent of their shells fell within the fort's walls. Their only real value was in silencing the guns *en barbette* and setting alight wooden buildings inside the fort. One mortar dug a hole seven feet deep on the fort's parade ground.

Confederate counterbattery fire had been totally ineffective, even before most of their guns were disabled.

The era of fortifications that had lasted from the days of Vaubaun were gone. A Union visitor after the surrender reported that rifled "steel pointed shot bored through the brick walls as if they were so much

paper." Old-fashioned forts were suddenly obsolete, due to modern heavy artillery, and, "We must have iron forts and ironclad ships."

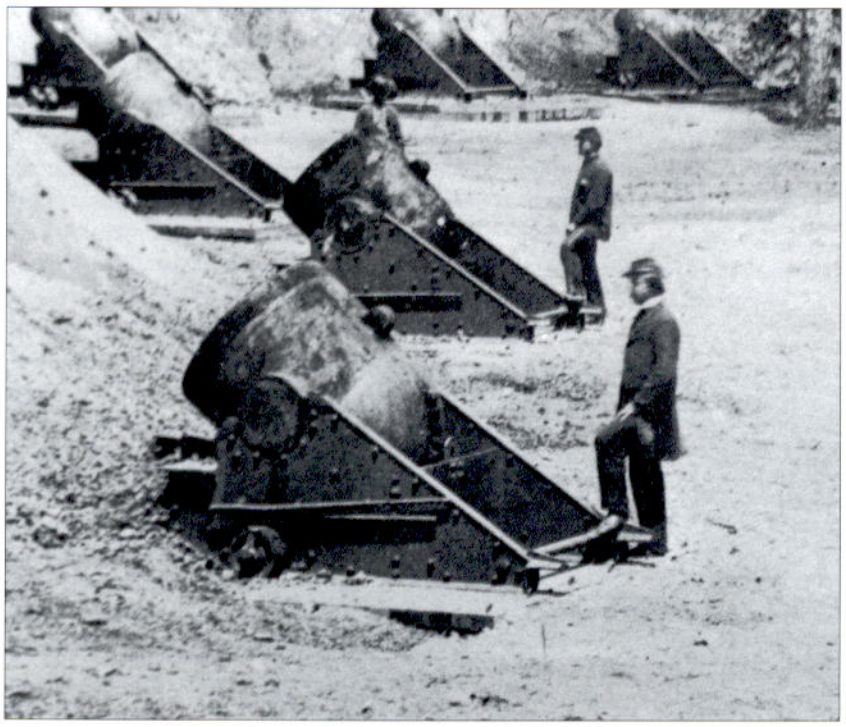
U.S. ARMY ORGANIZATION

Heavy artillery commands were organized largely along the same line as infantry regiments and battalions. According to an act of Congress passed in August, 1861: "Each regiment of infantry shall have one colonel, one lieutenant-colonel, one major, one adjutant (a lieutenant), one quartermaster (a lieutenant), one surgeon and one assistant surgeon, one sergeant-major, one regimental quartermaster-sergeant, one regimental commissary-sergeant, one hospital steward, two principal musicians, and twenty-four musicians for a band; and shall be composed of ten companies, each company to consist of one captain, one first lieutenant, one second lieutenant, one first sergeant, four sergeants, eight corporals, two musicians, one wagoner, and from sixty-four to eighty-two privates." A chaplain was also authorized.

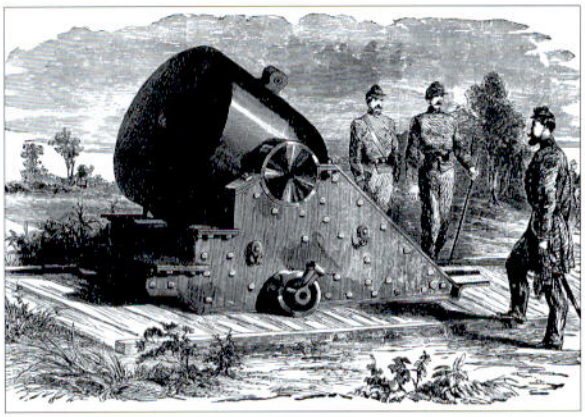
Heavy artillery companies required more specialized men, such as blacksmiths, so these regiments were larger than infantry regiments. According to Major Frederick Shonnard, 6th New York Heavy Artillery, "An infantry regiment was comprised of ten companies of 100 men each, while an Artillery regiment was composed of twelve companies of 150 men each, each company being called a Battery. Such an organization could be used entirely as Infantry, divided into three battalions of six hundred men each, or partly as infantry."

The Provost Marshal-General's office sent this message, on April 20, 1864, to each of the state governors: 'The Secretary of War has ordered that new regiments of heavy artillery that may be organized and filled up to the legal standard of 1,738 men, within the period of twenty days from this date, will be received and credited. If regiments are not full on or before the 10th of May the recruits will be put into other artillery or infantry organizations." At this point, the government would rather have had infantry than heavy artillery regiments.

Even so, the same basic 1861 company organization remained. On April 15, 1863, the XVI Corps issued orders for eight heavy artillery companies to garrison Fort Pickering.



Battery No. 4, one of 15 batteries planted to the south and southeast of Yorktown for McClellan's superfluous siege, contained ten 13-inch siege mortars. (Library of Congress)



A 13-inch mortar, weighing 17,000 pounds, as shown on the pages of *Frank Leslie's Illustrated News*.

They read:

"I. Pursuant to orders from the Secretary of War (Brig. Gen. L. Thomas, Adjutant-Gen. U. S. Army) there will be recruited and mustered into the service of the United States eight companies of colored men for service as heavy artillery at Fort Pickering.

"II. The recruiting, organization, and examination of recruits will be as directed by regulations.

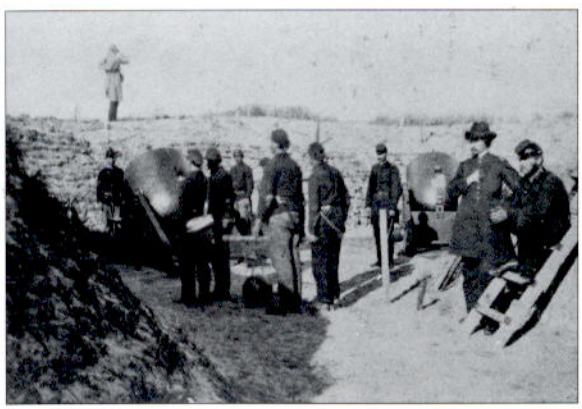
"III. Each company will have one captain, two lieutenants, and an orderly-sergeant, who will be white; the other noncommissioned officers will be from the colored recruits."

The following units were raised as regiments of heavy artillery for the U.S. Army: 1st Connecticut Regiment, 2d Connecticut Regiment, Ahl's Delaware Company, 1st Indiana Regiment, 1st Louisiana Siege Artillery Regiment (African Descent), 1st Maine Regiment, Maine Garrison Artillery, 1st Massachusetts Regiment, 1st Massachusetts Battalion, 2d Massachusetts Regiment, 3d Massachusetts Regiment, 4th Massachusetts Regiment, 130 Massachusetts Companies, 6th Michigan Regiment, 1st Minnesota Regiment, and the 1st New Hampshire Regiment.

From New York: the 2d New York Regiment, 3d New York German Battalion, 4th New York Regiment, 4th New York National Guard, 4th New York Battalion (1st Black River Artillery Battalion), 5th New York Regiment (2d Jackson Regiment), 5th New York Battalion (2d Black River Artillery Battalion), 6th New York Regiment (Anthony Wayne Guard), 6th New York Battalion (3d Black River Artillery Battalion), 7th New York Regiment (Albany County Regiment/Seymour Guards), 7th New York Regiment (4th Black River Artillery Battalion), 8th New York Regiment, 9th New York Regiment (2d Auburn Regiment/Cayuga and Wayne County Regiment), 10th New York Regiment (Black River Artillery/Jefferson County Regiment), 11th New York Regiment. 13th New York Regiment, 12th New York State Militia, 14th New York Regiment, 15th New York Regiment, and the 16th New York Regiment.

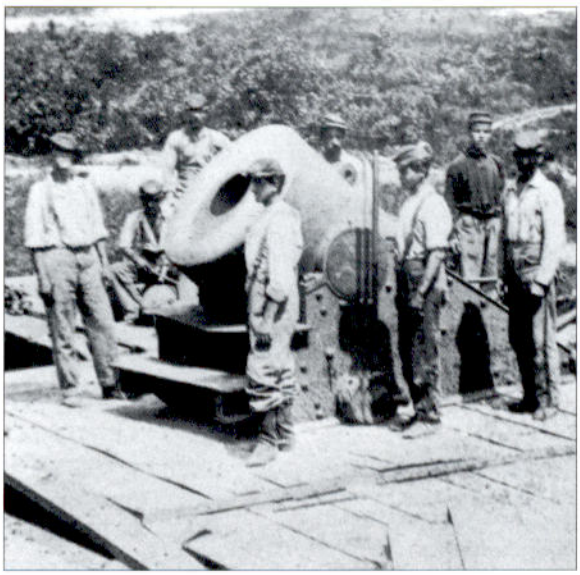
From other states: the 1st North Carolina Regiment (African Descent), 1st Ohio Regiment, 2d Ohio Regiment, 2d Pennsylvania Regiment (112th Volunteers), 2d Pennsylvania Provisional Regiment, 3d Pennsylvania Regiment (152d Volunteers), 5th Pennsylvania Regiment (204th Volunteers), 6th Pennsylvania Regiment (212th Volunteers), Robert's Pennsylvania Battalion, Segebarth's Pennsylvania Marine Artillery Battalion, the Pennsylvania Commonwealth Company, Ermentrout's Pennsylvania Militia Company, Jones' Pennsylvania Independent Company, Schooley's Pennsylvania Independent Company, Tyler's Pennsylvania Company, and Woodward's Pennsylvania Company.

A 13-inch mortar battery on Morris Island around the Union lines besieging Charleston.



Also: the 3d Rhode Island Regiment, the 5th Rhode Island Regiment, the 14th Rhode Island Regiment, 1st Tennessee Regiment (African Descent), 2d Tennessee Regiment (African Descent), 1st Vermont Regiment, and 1st Wisconsin Regiment.

In the United States Army: Battery A, 1st Artillery; Battery C, 1st Artillery; Battery D, 1st Artillery; Battery H, 2d Artillery; Battery I, 2d Artillery; Battery K, 2d Artillery; Battery B, 3d Artillery; Battery D, 3d Artillery; Battery H, 3d Artillery; Battery D, 4th Artillery; Battery L, 4th Artillery; Battery G, 5th Artillery; 1st U.S. Colored Trooops (USCT), 3d USCT, 4th USCT, 5th USCT, 6th USCT, 7th USCT, 8th USCT, 9th USCT, 10th USCT, 11th USCT, 12th USCT, 13th USCT, and 14th USCT.



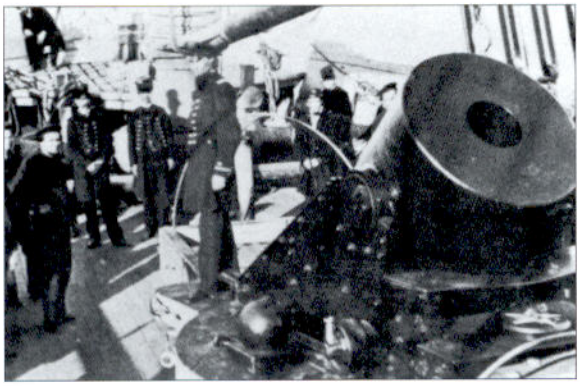
This 13-inch mortar was mounted on a railway car so as to be able to be fired from different places into the Confederate lines around Petersburg. (Library of Congress)

C.S. ORGANIZATION

Initially, heavy artillery was organized the same as infantry regiments or battalions. Each company, after November 1861, was set at a minimum of 70 men, with 10 companies in a regiment. This was raised to 150 men in a company as of October 11, 1862. A full regiment would rate a colonel, a lieutenant-colonel, a major, an adjutant who ranked as a lieutenant, a commissary who ranked as a captain, a quartermaster who ranked as a captain, a surgeon who ranked as a major, a sergeant-major, an ordnance sergeant, and a hospital steward. Each company would have a captain, a first lieutenant, a second lieutenant, an orderly or first sergeant, and a sufficient number of other noncommissioned officers.

On March 3, 1862, Adjutant & Inspector General Samuel Cooper wrote to the Secretary of War, Judah P. Benjamin, about a problem that arose from the small number of officers and NCOs in heavy artillery units: "The organization of these companies is the same as infantry, and some of them are assigned to batteries of from six to nine heavy guns. Each section of two pieces should be commanded by a lieutenant and each gun should be provided with a sergeant and corporal, so that a company serving a battery of eight guns should have four lieutenants, eight sergeants, and eight corporals; whereas at present organized the company consists of only three lieutenants, five sergeants, and four corporals." Benjamin agreed, sending the suggestion on to Congress, which also agreed, reorganizing heavy artillery to be the same as light artillery batteries on April 3, 1862.

The following Confederate units were specifically raised and served as heavy artillery units: 12th Georgia Artillery Battalion (Savannah Siege Train Heavy Artillery Battalion), 22d Georgia Artillery (Siege) Battalion, 28th Georgia Artillery Battalion, 1st Regular Louisiana Artillery Regiment, 2d Louisiana Artillery Battalion, 8th Louisiana Artillery Battalion, 1st Mississippi Artillery Regiment, 1st North Carolina Heavy Artillery Battalion, 3d North Carolina Artillery Battalion, 10th North Carolina Artillery Battalion (2d Battalion Heavy Artillery),



The Navy mounted 13-inch mortars on schooners to use to bombard shore points, such as Forts St Philip and Jackson outside New Orleans in 1862. (Library of Congress)

10th Regiment North Carolina Volunteers Artillery (five companies), 40th Regiment North Carolina Volunteers–3d Artillery, 1st South Carolina Heavy Artillery Regiment, 2d South Carolina Heavy Artillery Regiment, 3d South Carolina Heavy Artillery Regiment (1st Regulars), 15th South Carolina Heavy Artillery Battalion, 18th South Carolina Heavy Artillery Battalion (Siege Train Artillery Battalion), 1st Tennessee Heavy Artillery Regiment, 1st Texas Heavy Artillery Regiment, 3d Texas Artillery Battalion, 2d Virginia Heavy Artillery Regiment (Home Artillery), 4th Virginia Heavy Artillery Regiment, 10th Virginia Heavy Artillery Battalion, 18th Virginia Heavy Artillery Battalion, 19th Virginia Heavy Artillery Battalion, 20th Virginia Heavy Artillery Battalion, and Johnston Heavy Artillery (Virginia).

CONCLUSION

Experience in the Civil War proved that the age of the smoothbore cannon was gone. Rifled cannon could tear down the strongest forts built in the age of the smoothbore. Navies developed iron ships to replace their wooden ones, and only rifled guns were able to penetrate this new armor.

At the same time, new casting methods allowed foundries to make guns of ever-larger calibers that could fire at greater distances. This meant that the forts used to defend American ports had to be placed even further from the cities so that they could defeat enemy fleets before their ships came in range of their targets. The old brick forts placed just outside American cities were suddenly obsolete.

More durable carriages able to stand these larger guns, requiring less of the constant maintenance needed for wood carriages, were designed and made of iron. The result was that at the end of four years of war, American siege artillery and the fortifications it defended looked very different than at the beginning of the war.

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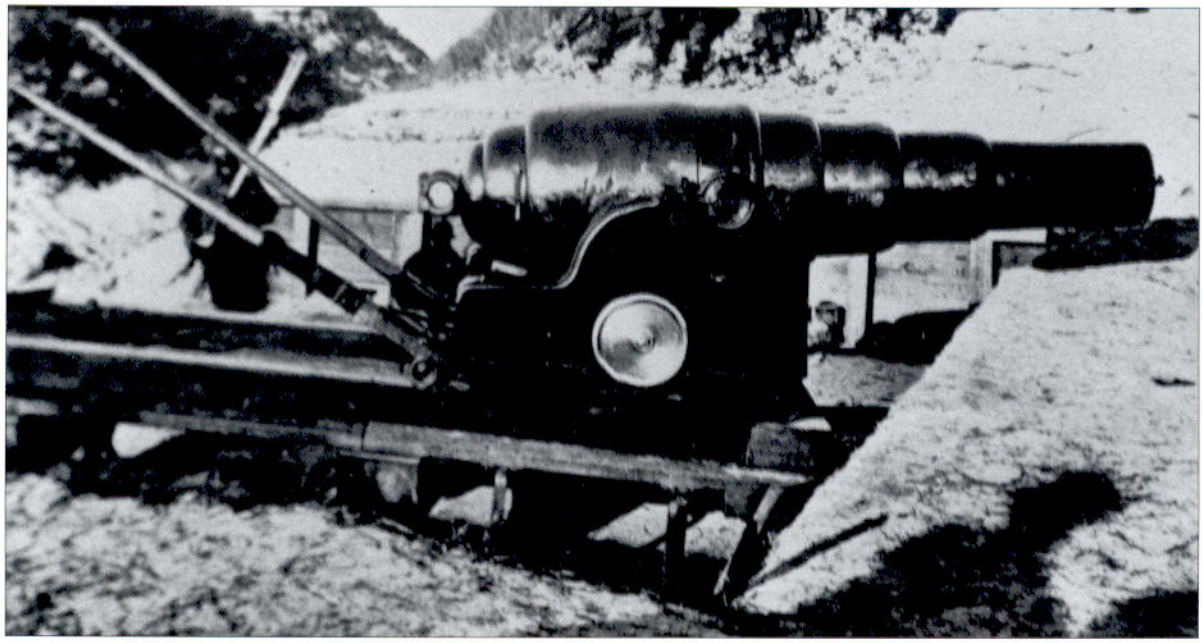


The 150-pounder Armstrong gun at Fort Fisher, one of the best defended posts in the Confederacy, had an 8-inch bore. Note the handspikes in position to roll the gun forward to fire. (U.S. Army Military History Institute)

THE PLATES

A: THE 24-POUNDER SIEGE GUN AND CARRIAGE

The M1839 24-pounder smoothbore gun was the heaviest American cannon that could be moved in the field with relative ease. A limbered piece weighed 10,155 pounds, including limber, and took 10 horses to pull. Nonetheless, the Union Army of the Potomac brought some of these guns to the front where they saw much use during the Battle of Fredericksburg. The gun was capable of firing solid shot that penetrated eight feet six inches of old earthen works at 100 yards, and almost two feet of stone and three feet of brick fortifications. The gun could also be used to fire grapeshot, canister, and spherical case shot.

According to *The Handbook of Artillery for the Service of the United States* by Joseph Roberts (New York, 1863), the 24-pounder's carriage "is similar in its construction to the field-carriage, but is joined to the limber in a different way. Projecting upwards from the limber and in rear of the axle-tree, is placed a pintle, which enters a hole made in the trail from the underside, and a lashing-chain and hook keeps the two parts together when once in position. The weight of the trail resting on the rear end of the tongue keeps this nearly horizontal, and relieves the horses of the weight of it, which, as it must be both long and heavy, is too much for the horses to carry.

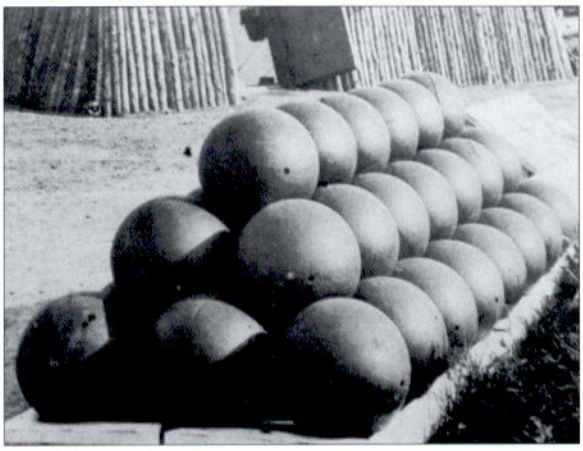
"The splinter-bar is, as in field-carriages, stationary, but the traces of the next team are attached to a movable bar which is connected with the end of the tongue. The tongue is furnished with pole-chains, but no yoke, and the rest of the teams are harnessed as in field-artillery. The axle-trees are of iron, with axle-bodies of wood; which last, by its elasticity, renders the shock from the piece less direct and violent.

"On the upper surface of the cheeks, near the rear ends, are placed two projecting bolts which with the curve of the cheeks, form resting places for the trunnions, when the piece is in position for transportation. They are called travelling trunnion-beds. When the piece is in this position, its breech rests upon the bolster, which is a curved block of wood, bolted to the upper side of the stock. On each side of the trail, and perpendicular to it, a strong maneuvering bolt is placed to serve as places to apply the handspikes in maneuvering the carriage."

B: THE 8-INCH COLUMBIAD ON A CASEMATE CARRIAGE

The 8-inch columbiad, a standard fortification cannon, fired a 32-pound shot and required seven or eight men to fire. It was mounted on a wooden casemate carriage, resting on a roller that allowed the recoil of the gun, after it was fired, to move it back into position for reloading. Iron rails on the floor at the front and rear of the carriage allowed the gun to be moved from side to side for aiming.

According to Roberts' *The Handbook of Artillery for the Service of the United States*, the wooden casemate carriage "consists of two cheeks, joined together by as many transoms, and supported in front by an axle-tree on truck wheels, and in rear on the rear transom, which is notched to fit the tongue of the chassis. Each cheek is formed of two pieces, one on top of the other, and connected by dowels and bolts. On the underside, near the front, a notch is cut for the reception of the axle-tree, which is of oak; and nearly over the axle, on the upper side of the cheek, the trunnion bed is placed. The rear of the upper piece of the cheek is cut into steps, which give a better hold for the assembling-bolts, than a uniform slope, and give purchases for the handspikes, in elevating the piece. On the inside of each cheek, just in rear of the axle, a vertical guide is fixed to keep the carriage on the



The magazine at Battery Rodgers, in Alexandria, Virginia. Ammunition for the columbiads is stacked in the open in front of the battery. Different colors were used for different types of ammunition. (Library of Congress)

chassis. It is of wood and bolted to the front transom and axle-tree. The top of the front transom is hollowed out, to admit the depression of the piece. Behind the rear transom and at the notch cut in it, there is an eccentric roller, so arranged as to bear the weight of the rear part of the carriage, or not, according as it is thrown in or out of gear.

"Near the rear end of each cheek, and outside, a heavy trail-handle of iron is placed, and used in maneuvering the piece. On the ends of the axle truck-wheels are placed, with mortices sloping outwards in the direction of the radii, for the insertion of the handspikes in running from battery.

"The elevating apparatus consists of a cast-iron bed-plate, secured to the rear transom; an elevating-screw and brass nut; the nut being acted on by an oblique-toothed wheel, turned by a handle placed outside the right cheek."

C: A TYPICAL SEACOAST PREWAR FORTIFICATION

The American military, more concerned with a seaborne invasion of their country rather than an overland one from the west or north, built a chain of brick or stone forts around all the nation's seaports. These were usually quite similar and featured one or two levels of casemates, each pierced by guns, with a line of additional cannon on top of the fort, en barbette. A moat was generally dug around the outside of the fort, while buildings inside housed officers and men and their equipment. The open center of the fort was used as a parade ground. A shot furnace, usually placed near the casemates, was used to heat shot to fire into enemy wooden ships.

D: THE 100-POUNDER PARROTT RIFLE ON AN IRON CASEMATE CARRIAGE

Carriages made of wrought iron replaced wood carriage in U.S. Army fortifications, although the Confederates never had enough iron available to modernize their carriages in this way. Many of these carriages were still in active use in forts such as Fort McHenry, Baltimore, Maryland, as late as World War I. The Parrott on this carriage was loaded while at the end of the carriage and then it was run out to be fired over the fortifications. Trucks with eccentric axles were used to run the gun out. The axle was turned with a wrench placed on the hexagonal end to make the trucks bear on the slide. Handspikes were then placed into holes on the truck rims to work the gun forward.

This fortification is typical of those built by both sides to defend their capital cities, Washington and Richmond, using wicker gabions and sandbags over which earth was thrown to make walls.

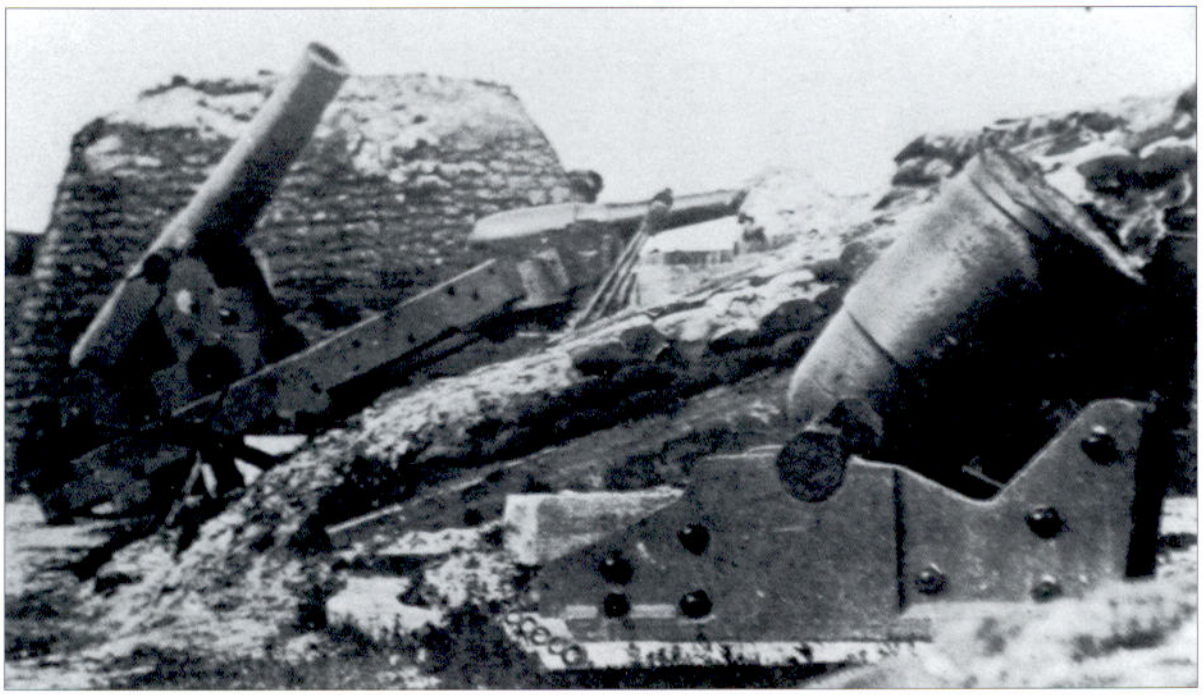
E: A150-POUNDER ARMSTRONG TOP, AND A 13-INCH SIEGE MORTAR AND CARRIAGE, BOTTOM

One of the most powerful weapons used by the Confederates was the British-made Armstrong cannon. They were found at Confederate forts from Vicksburg to Fort Fisher, North Carolina. These were muzzle-loaders, but rifled and highly accurate. The gun tubes had spiral coils, welded together under a steam hammer, wound around the barrel to resist the force of firing. The hoops were turned to slightly smaller diameters than the previous hoop, then expanded by heating before being dropped into place. On each side of the iron carriage was a regulating wheel that clamped the gun in place on its rails. The main problem the Confederates had with their Armstrong guns was that the ammunition they made locally didn't work well, and they had to depend on expensive imported ammunition for the best results.

The bed for the mortar was described by John Gibbon in *The Artillerist's Manual* (New York, 1860): "The bed consists of two cheeks, joined by two transoms, all cast together in the same piece. The maneuvering bolts, placed on each side, one near each end of the cheeks, are made of wrought iron, and set in the mold when the bed is cast.

"On the front transom is fastened a wooden bolster, grooved to receive the elevating quoin, which it is prescribed

Grapeshot, small cast-iron balls in a canvas bag used as anti-personal ammunition, sits in front of this 11-inch Dahlgren smoothbore gun, with a solid shot behind it. This scene was in the abandoned Confederate works at Yorktown in 1862.



should be put in position in a direction perpendicular to the axis of the piece, but is usually for convenience placed obliquely.

"Notches on the underside of the front and rear of the cheeks, give hold to the handspikes in throwing the piece to the right or left.

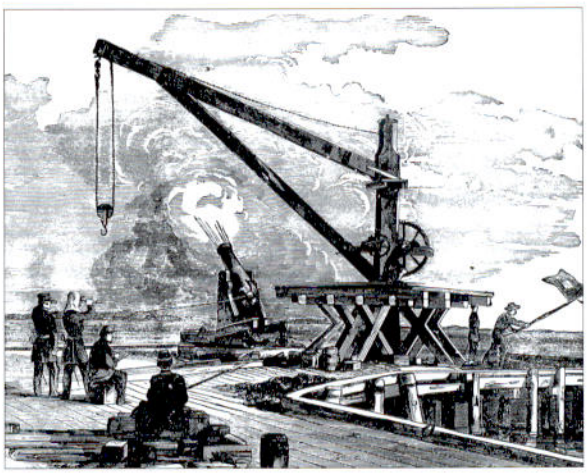
"Cap-squares are used with these beds, but probably only for the purpose of preventing the piece from jumping from its place when fired at very small angles of elevation, as, for instance, in ricochet firing."

In loading the 13-inch siege mortar, a cannoneer placed a powder bag in the bore. Then two men carried the round shot by means of tongs hanging on a wooden rod up the two steps to the mortar bore. A third man centered the shell in the bore, and it was then loaded into place. The men were also able to move the mortar on its wooden bed by means of handspikes that were inserted into the hole on the wheel on each side.

F: THE FORTIFICATIONS OF VICKSBURG

Control of the Mississippi River was considered vital by both sides. Vicksburg, a city halfway along it in the state of Mississippi, sitting on high bluffs overlooking the river, was a natural place for the Confederates to defend their control of the river. They spent hundreds of thousands of dollars, and used some of their best heavy ordnance, on the fortifications of Vicksburg, especially after the fall of Memphis in the north and New Orleans in the south. As designed by the chief engineer, the initial works along the river consisted of seven batteries with 18 guns placed on the 200-feet-high bluffs. According to one Confederate officer: "These batteries were located chiefly below the city; their positions were well

ABOVE **The top *en barbette* guns at Fort Pulaski after the Union bombardment. One of the columbiads has been placed so that it might be used essentially as a mortar. (Library of Congress)**



RIGHT **The caption on this 1861 illustration from *Frank Leslie's Illustrated News* reads: "Practicing with the celebrated Sawyer gun on the Confederate batteries at Sewall's Point, near Norfolk, Va., from Fort Calhoun, on the riprap in front of Fortress Monroe. The distance was three and one half miles, the guns were forty-two pounders (rifle), columbiads, and were the only guns then in use that could carry that distance." This essentially experimental gun, invented by Massachusetts native Sylvanus Sawyer, was a 5.862-inch rifled weapon that fired a special projectile. It was, in practice, not very successful and was phased out of service as quickly as possible.**

chosen; they had fine command of the river against a fleet coming from below." In June, 1862, another officer added that the local garrison "was engaged in strengthening the batteries already constructed, in making bomb-proof magazines, and in mounting new guns recently arrived. Several new batteries were laid out by myself on the most commanding points above the city; these were afterward known as the 'Upper Batteries.' " Despite the number and caliber of these guns, the Federal Navy sent a mockup of an ironclad, built around a barge, past the guns from the north one evening and, seeing that she took relatively little damage, was later able pass the city from either side with relative ease. The boats simply went by too fast to sustain serious damage.

G: AMMUNITION

A. An 8-inch Schenkl shell. The bottom of the cast-iron shell is covered in painted papier mâché that would safely self-destruct during firing. The shell front was hollow, and filled with gunpowder with a nose-mounted fuse that could fire on contact or at a set time. This was the same system used by all these shells. This was a U.S. design.

B. A 24-pounder Dyer shell. These shells used lead coverings, on the bottom half of the shell, that would fit into the gun's rifling when fired. This was a U.S. design.

C. A 4-inch Hotchkiss shell. Firing forced the cast-iron cup on the bottom of the Hotchkiss shell up and into the front piece, forcing the lead around the middle up and into the gun's rifling for accuracy. It was covered with a piece of greased canvas to lubricate it as it moved in the gun barrel. This was a U.S. design.

D. A 3.75-inch Sawyer shell. The Sawyer shell was entirely covered in lead which would then take the gun's rifling when it was fired. This was a U.S. design.

E. A James shell. The James shell used slanted iron ribs to spin through space for accuracy. It had lead covered with light tin plate that would expand to fit the gun's rifling when fired, and it was also wrapped in greased canvas for lubrication. On firing, gases would enter the open center of its iron ribcage, expanding and forcing the lead and tin plate into the rifling. This was a U.S. design.

F. A 4.5-inch Absterdam. This shell used a lead sabot, with a convex opening, that would be expanded by gases into the gun's rifling for accuracy. This was a U.S. design.

G. Mullane bolt. Strictly a Confederate shell, the Mullane had a convex copper sabot in its rear that was expanded by gases on firing to fit the gun's rifling. Because of the scarcity of copper in the Confederacy, the Mullane was not widely used, although examples of it have been found on battlefields of all theaters of the war.

H. Typical fuse (Hotchkiss).

Inside the defenses of Fort Pulaski, showing how Union rifled guns tore the fort's brick walls apart and made firing back impossible. (Library of Congress)

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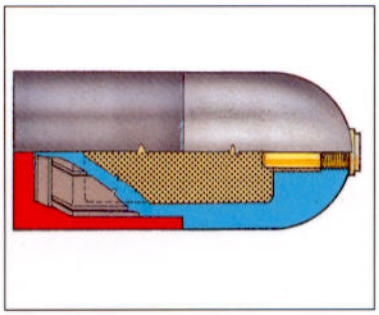

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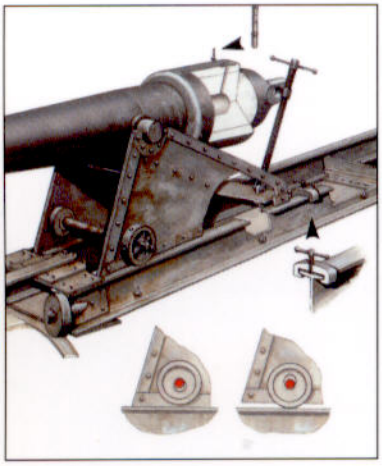

Cutaway artwork

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American Civil War Artillery 1861–1865 (2)

Heavy Artillery

Because of the length of the coastline of the United States, from the beginning American ordnance and engineers placed an emphasis on heavy artillery mounted in coastal defenses. The Union army organized its 'Heavy Artillery' into separate regiments, uniformed and equipped differently. While the Field Artillery was assigned across the fighting fronts Heavy Artillery units served the big guns in the forts and the defenses of Washington. The Confederates did not differentiate types of artillery and those that became known as Heavy Artillery did so through informal association rather than formal designation. This book details the development and usage of the big guns.

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